S·A·E Journal

AUG 1 1940

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- Unit Frame and Body — D. W. Sherman
- Axle and Transmission Lubrication — William S. James
- Production of Magnesium-Alloy Aircraft Parts — L. B. Grant
- A New Method of Testing and Grading Fine Abrasives — E. L. Hemingway
- Passenger Comfort in Commercial Aviation — W. W. Davies

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S·A·E Journal

Published Monthly by The Society of Automotive Engineers, Inc.

Arthur Nutt, President — David Beecroft, Treasurer

John A. C. Warner, Secretary and General Manager

Norman G. Shidle, Executive Editor

About Authors

■ WILFRED W. "BILL" DAVIES *got his first taste of "high flying" on the Sky Ride at Chicago's Century of Progress Exposition. He was a draftsman on the Exposition staff and the Sky Ride was one of the projects upon which he worked. At the close of the Exposition, Mr. Davies joined United Air Lines and served in the maintenance engineering and general engineering departments before becoming research engineer in charge of performance information and passenger comfort. In this capacity he has conducted numerous experiments in high altitude flying in relation to the physical well-being and comfort of passengers and crew. When a new world's altitude record for transport planes was made by a United Air Lines' Mainliner ascending to 29,800 ft with a group of University of Chicago scientists on board to photograph cosmic rays, Mr. Davies was in charge of the oxygen equipment aboard the plane. He is a graduate of Armour Institute of Technology and while working for his degree had a part-time job with National Air Transport, a predecessor unit of United Air Lines.*

■ *For the past 13 years* L. B. GRANT *has been identified with the magnesium industry. In 1927 he joined the Dow Chemical Co. as metallurgist and five years later took his present position as sales manager for their Dowmetal division. He was graduated from Michigan State College in 1922 with a B.S. degree in Chemical Engineering. Soon after he joined the Hayes Wheel Co. as metallurgist, continuing with that company until he started with Dow.*

■ *Twenty-three years ago* E. L. HEMINGWAY *started as a helper in the assembly department of the Foster Machine Co. His interest in the study of metallurgy and the treatment of steel resulted in a transfer to the heat-treat department, of which he later became foreman. Mr. Hemingway since organized a metallurgical laboratory for the company and has been advanced*

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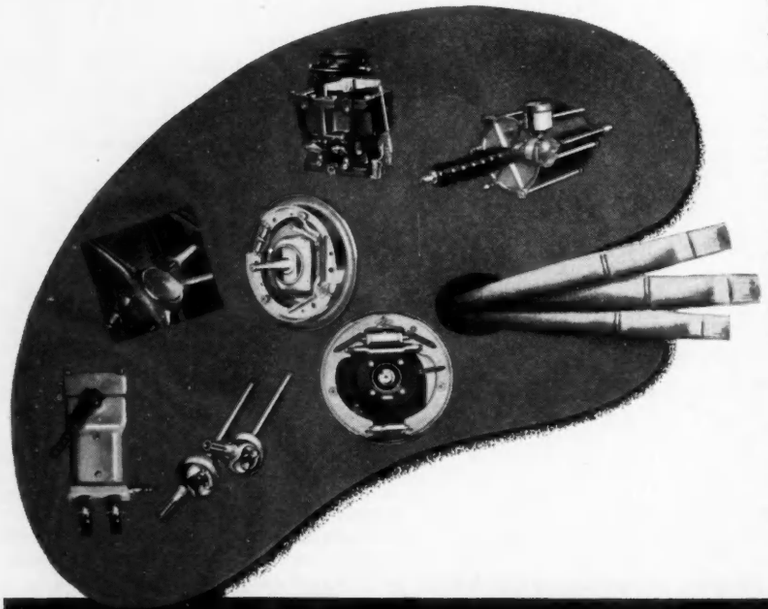
THE AMERICAN MOTOR CAR OF TOMORROW

Whoever the artist, whatever the style . . .
Bendix is part of the picture!



MANY an influence had helped to mould the motor car of today . . . and tomorrow's car which is now in the drafting and mock-up stages.

Engineers, artists, artisans, craftsmen, scientists and specialists of high and low degree—all have left their mark. Few, however, have made deeper or more enduring impress than Bendix.

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SAE DEFENSE AID Implemented

HILL HEADS NEW QMAC; ORDNANCE WORK EXPANDS STRYKER JOINS SAE STAFF

SAE response to government calls for preparedness help has been swift, mobile and effective. Since June 16, a new SAE-Quartermaster Corps Advisory Committee has been set up; the vital standards program on aircraft and aircraft-engine materials has been integrated and stimulated by the addition of Carleton E. Stryker to the SAE headquarters staff; the long-established activity of the SAE Ordnance Advisory Committee under the leadership of Col. H. W. Alden has been expanded and intensified. Immediate SAE assistance in national defense is being implemented chiefly through these three channels – all of them organized and directed by the SAE National Defense Committee, headed by Past President B. B. Bachman. To each group, specific work assignments have already been made, and committees are already on the job.

■ SAE-QMC Advisory Committee

Newest of the SAE national defense groups is the SAE Quartermaster Corps Advisory Committee, named by the SAE National Defense Committee in response to a formal request for cooperation from Major Gen. E. B. Gregory, Quartermaster General of the U. S. Army.

Headed by L. Clayton Hill, vice president, Murray Corp., a former SAE Councilor, this committee has already organized specialized subcommittees which are now working actively with the Quartermaster Corps on standardization and interchangeability of parts involved in military motor-vehicle design. Officially representing the Quartermaster Corps in supervision and development of this program is Major M. V. Brunson, who has been a member of the Society since 1924 and has been actively associated with its procedures for many years. Functioning under Mr. Hill in this project are four subcommittees, each dealing with specific phases of the problem as presented by the Quartermaster Corps. Mr. Hill's SAE Quartermaster Corps Advisory Committee to date consists of J. E. Padgett, vice president, Spicer Mfg. Corp.; L. P. Kalb, vice president, Continental Motors Corp., and the chairmen of each of the four subcommittees. A chairman and two members were named by the National Defense Committee at a meeting with Major Brunson in New York on June 25, for each of the SAE-QMC Advisory Committee subcommittees. It was the understanding that the men so named would be responsible for getting done the jobs assigned to their divisions by calling for assistance from such other SAE members as they might need in connection with specialized phases of the work.

The personnel of four SAE-QMC Advisory Committee subcommittees is as follows: Electrical – L. E. Lighton, Electric Storage Battery Co., chairman; R. M. Critchfield, Delco-Remy; L. H. Middleton, Electric Auto-Lite Co. . . . Engine – J. B. Fisher, Waukesha Motor Co., chairman; E. H. Shepard, Chevrolet; Louis Schwitzer, Schwitzer-Cummins Co. . . . Transmission and Axle – B. W. Keese, Wisconsin Axle, chairman; J. W. B. Pearce, Spicer Mfg. Corp.; Harry Williams, American Chain & Cable Co., Inc. . . . Chassis – M. C. Horine, Mack Mfg. Corp., chairman; C. A. Pierce, Diamond T Motor Car Co.; C. W. Kynoch, Chrysler Corp.

L. C. Hill, Murray Corp., chairman of the newly organized SAE Quartermaster Corps Advisory Committee, and Col. H. W. Alden, Timken-Detroit Axle Co., chairman since 1919 of the SAE Ordnance Advisory Committee

Arthur Nutt,
SAE President

The SAE strides in national defense work described in these pages have followed closely the thoughts of President Arthur Nutt, expressed in his cable from Paris at the time of the SAE 35th Anniversary Summer Meeting, in which he said:

"Value of many SAE services being demonstrated repeatedly over here. Bonding of engineering profession through SAE of greatest importance. Urge close cooperation in preparation for all possible emergencies."

President Nutt has now returned from abroad and is working closely with his SAE National Defense Committee.

Following the appointment of the SAE-QMC Advisory Committee, the committee as a whole and its various subcommittees were called into immediate action by Major Brunson at conferences held in Detroit on July 10 and 11. Since that time, active technical work has been going forward at a constantly accelerating pace.

■ SAE Ordnance Advisory Committee

In the case of the SAE Ordnance Advisory Committee cooperative activity has been in progress for many years between the SAE and the Ordnance Department. With added national defense responsibilities, its program and membership are being extended so that it may function rapidly and smoothly.

At a special meeting with Ordnance officers at Aberdeen, Md., July 24-26, arrangements were made for increasing the personnel of the SAE Ordnance Advisory Committee and for establishment of subcommittees to attack detailed problems in more specialized manner.

■ Aeronautic Work

Strong demands from important Washington sources for further increases in the recently intensified aircraft standards work of the Society reached a peak late in June and resulted in the appointment by SAE Secretary and General Manager John A. C. Warner, to SAE headquarters staff of Carleton E. Stryker, well-known Pacific Coast aircraft engineer, to take charge of the greatly expanded responsibilities in this field. Under the leadership of SAE President Arthur Nutt, SAE aircraft standards work was greatly accelerated early in 1940. Confirmation of the immediate importance of further SAE action has come from many important sources.

The function the SAE will be expected to perform was clearly emphasized, for example, by T. P. Wright, Curtiss-Wright vice president, on leave of absence from his company to serve as Consultant to the Aeronautical Section of the Knudsen-headed industrial production division of the National Defense Advisory Commission, when he explained late in June that the SAE would be expected to undertake consolidation of standards work pertaining to aircraft and aircraft-engine parts and materials because "it already possesses the system and the machinery for carrying out the job based on wide experience in carrying through a highly successful standardization program for many years.

"I am sure," Mr. Wright stated, "that all government bureaus and departments which have to do with the aircraft procurement program will appreciate the willingness and determination of the SAE to carry through this program."

The accelerated projects which are now being directed by Mr. Stryker really comprise a specialized and re-implemented phase of the aircraft standards work that has been a vital part of SAE standards activity for 24 years.

This division of the Society's 30-year-old standardization program had its start in 1916. Soon after, it was plunged into a program of establishing specifications and standards for parts and materials for use in military planes, as the United States entered the first World War.

Progressing with the industry, the growth of SAE aeronautic standardization work accelerated rapidly in 1939. In that year the Aircraft and Aircraft-Engine Divisions of the Standards Committee were augmented by the Aircraft Materials Division, created in October of that year. This division was organized by the SAE Council in response to a request by the Aeronautical Chamber of Commerce of America that the SAE take over and continue the work of the Materials Committee organized under its Technical Committee.

The new SAE division, under the chairmanship of B. Clements, Wright Aeronautical Corp., immediately picked

Carleton E. Stryker, who has joined SAE Headquarters Staff, will assume staff responsibility for SAE aircraft activities, particularly in connection with the Society's rapidly expanding national defense program

up the work of the ACCA in its program of establishing some 300 material and process specifications for aircraft powerplants, structural materials, accessories, and equipment. By June of this year more than 100 of these specifications were completed and ready for restricted distribution.

The Aircraft-Engine Division is continuing its work on aircraft screw threads, termed by SAE President Arthur Nutt as "one of the most important engineering and design problems facing the aircraft industry." The division has completed the Aircraft Engine Testing Code and the large number of special forms included in it are being prepared for reproduction. It also is expediting coordinated standardization for aircraft involute-spline fittings and many other engine parts and accessories. Mr. Nutt is chairman of this division.

Standardization of aircraft structural fittings and parts, accessories, and equipment (including instruments) is being pushed by the Aircraft Division of which J. T. Thompson, Glenn L. Martin Co., is chairman. Working with Mr. Thompson as Eastern vice-chairman is Eric Dudley, Curtiss-Wright Corp., and as Western vice-chairman, J. F. Cox, Vega Aircraft Co., who recently succeeded E. J. Kasnicka, Lockheed Aircraft Corp.

Notable in the SAE work on aircraft fuels is the reduction of specifications from 18 to 5. Work on aircraft lubricants has featured preparation of inspection forms for radial air-cooled engines for use in the collection of research data.

The entire SAE aircraft standardization program is closely coordinated with the Army and Navy air services and is receiving full cooperation and assistance from the Aeronautical Chamber of Commerce of America.

Mr. Stryker, who assumed his new duties as a member of the SAE headquarters staff about the middle of July, came to his post in this important national defense project from Burbank, Calif., where he was associated with Bendix Aviation, Ltd. He has been in the aeronautical industry since 1917 and was an instructor in the U. S. Navy Aviation Gas Engine School at Columbia University during the first World War. From there he was called to aid in establishment of the Great Lakes Aviation School. He still holds a lieutenant's commission as aviation specialist in the Naval Reserve.

Major M. V. Brunson, Quartermaster Corps, U. S. Army, designated by Quartermaster General E. B. Gregory as the officer to whom the SAE Quartermaster Corps Advisory Committee shall report

B. B. Bachman, chairman, National Defense Committee

As this issue of the SAE Journal goes to press, Mr. Bachman reports: "A program has been started on which progress has been made. The National Defense Committee appreciates the response which has been given by those who have been called to work and confidently expects each member to be ready when his turn comes."

Expounding the objectives of the National Defense Committee, Mr. Bachman says its duty is "to advise the Council on matters of policy and to organize the facilities of the Society so that they may be placed at the disposal of the Government promptly and effectively."

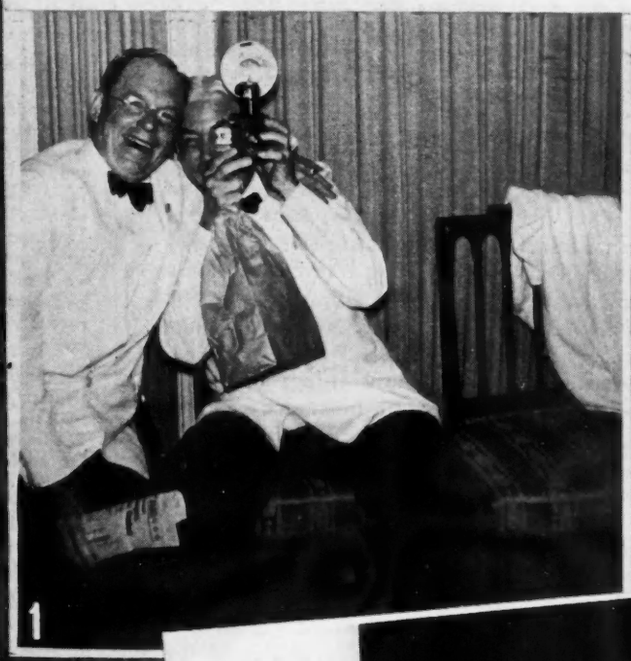
Following the first World War, Mr. Stryker designed powerplants for the Aircraft Engine Co. of Oakland, Calif.; was designer and engineeer for the Airplane Development Corp. at Glendale, Calif.; and then became chief engineer of the Curtiss-Wright Technical Institute of Aeronautics at Glendale. At one time he was consultant for the Aeronautics Branch of the Department of Commerce.

Born in Buchanan, Mich., Mr. Stryker had his elementary education in Los Angeles and was graduated in mechanical engineering from the University of Michigan in 1916.

It has been largely through the pioneering efforts of Mr. Stryker that the SAE National Aircraft Production Meetings, held annually in Los Angeles since 1936, have become vital forums to production executives and engineers. Mr. Stryker organized the first meeting in cooperation with the Society's Aircraft and Aircraft-Engine Activities, and by again serving as its general chairman in 1937 and 1938, saw the meeting "come of age."

In addition to the special effort which is being put upon acceleration of material specification for aircraft and aircraft engine parts, active work is under way looking toward simplification of airplane tire size standards. Participating in this effort, SAE representatives are working closely in cooperation with the military branches, the Aeronautical Chamber of Commerce of America, the Rubber Manufacturers Association and with T. P. Wright of the Advisory Commission to the Council for National Defense.

Prize winners ★ SAE Journal



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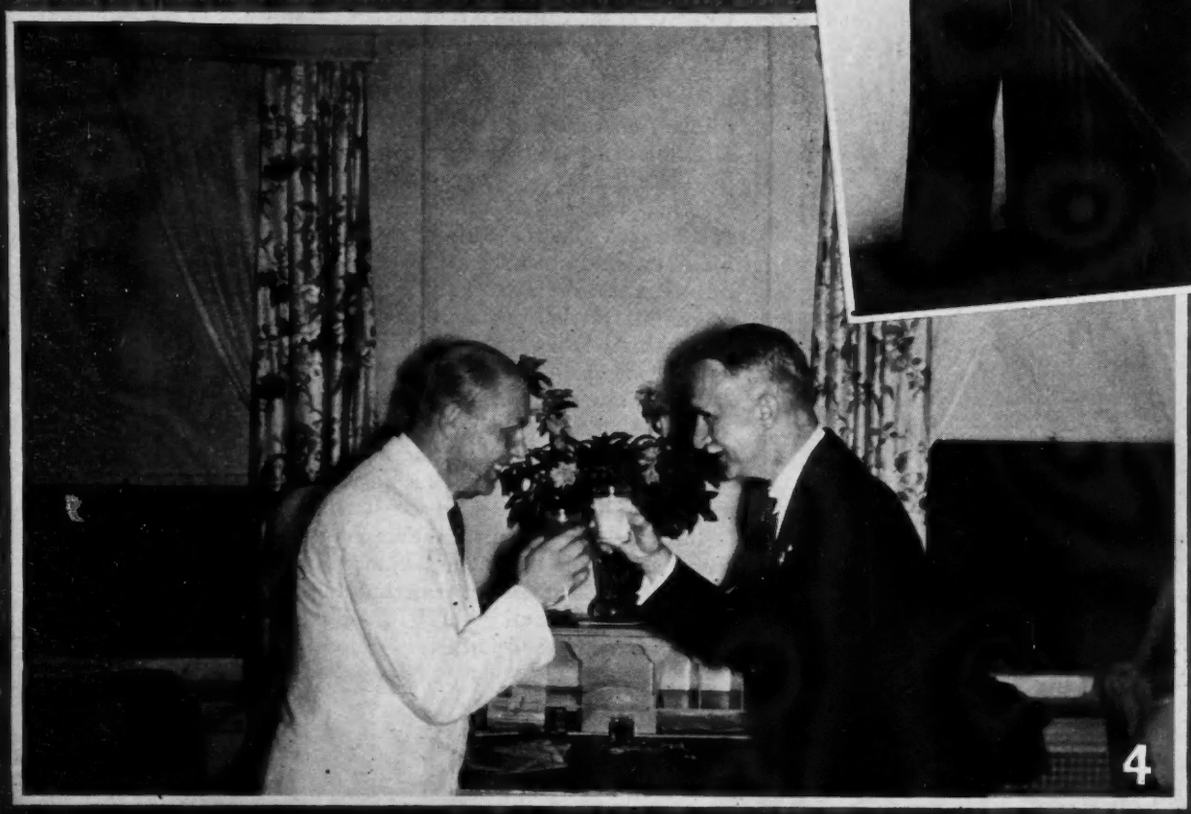

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PHOTOGRAPHIC CONTEST

HERE they are! The eight prize-winning pictures from that exciting frolic during the Grand Ball at the 35th Anniversary Summer Meeting at White Sulphur Springs. One winning picture has been selected for each of the eight classifications announced – and the judges are permanently anonymous!

1 "Hold everything" – Mrs. H. T. Woolson

2 "The early bird gets the worm" – Mrs. C. W. Georgi

3 "Full Member in good standing" – Mrs. E. L. Potter

4 "Here's how!" – Tore Franzen

5 "Camera, lights, action!" – R. W. Johnson

6 "Good to the last drop" – W. A. Wright

7 "Barnum was right" – U. B. Bray

8 "All's well that ends well" – A. G. Cattaneo and W. V. Hanley

It took us a long time to decide on these prize winners because the quality of the 200 photographs submitted was so uniformly high. Before we finished, we were wishing we had 80 prizes to award instead of eight. Anyhow, a good time was had by all – and that was the important thing.

The Judges

West Coast T&M Meeting Next Big SAE Attraction

■ *Seattle's New Washington Hotel will be*

■ *Scene of Two-day Forum Aug. 16 & 17*

AUGUST 16 & 17 are the dates that will find Pacific Coast fleet executives attending the SAE West Coast Transportation and Maintenance Meeting at the New Washington Hotel, Seattle. Sponsored by the Northwest, Oregon, Northern California, and Southern California Sections of the Society with full cooperation from the T&M Activity, the meeting is under the direction of General Chairman Harley W. Drake, superintendent of equipment, Pacific Highway Transport.

Truck Performance Formulas, Shop Management, Fuels, Lubrication, and Human Administration are the topics of papers already definitely scheduled for the two-day forum as the August SAE Journal went to press.

Truck Performance Rating

How "rule of thumb" methods fail when applied to rating truck performance will be shown by John Wiggers, chief engineer, Moreland Motor Truck Co. He will explain and demonstrate scientific methods developed by truck engineers. "Every truck operator is vitally interested in what he can expect of his equipment under the varying conditions of load, highway grade, and elevation. Any theorist can develop formulas, but it takes the judgment of an engineer to select proper constants and utilize properly these formulas," said Mr. Wiggers in referring to his paper, "Practical Use of Truck Performance Formulas." Mr. Wigger's paper will be presented by Rex Taylor, maintenance superintendent, Yellow Cab Co. of Los Angeles.

Shop Management

Harry J. McIntyre, professor in the University of Washington engineering department, who will present the paper, "Shop Management and Efficiency," was for several years associated with the Ford Motor Co. at Highland Park and Seattle. Besides being a professor in mechanical engineering, Prof. McIntyre is a lecturer in the University's School of Economics and Business.

A Diversion

August is salmon month in Washington. Early Sunday morning – at 2 a.m. – all visitors desiring to go fishing will be provided with boats, tackle, and guides. Arrangements are being made by the Northwest Section, hosts to the meeting.

Internal-Combustion Fuels

"Internal - Combustion Engine Fuels" will be discussed by S. H. Graf, director of engineering research and professor of mechanical engineering at Oregon State College. Prof. Graf is well known as head of the O. S. C. Engineering Experimental Station, which for several years has had as one of its major projects the testing and analysis of all types of internal-combustion engine fuels that have appeared on the market. Automotive fuels also have been Prof. Graf's personal hobby for many years.

Lubricating Oils

The relationship between the physical and chemical properties of lubricating oils and their performance in an engine will be covered by Lloyd H. Mulit and F. W. Kavanagh, research engineers, Standard Oil Co. of Calif., in their paper, "Lubricating Oils for Internal-Combustion Engines." It will be presented by Mr. Mulit, who is supervisor of the company's lubrication research laboratory at Richmond, Calif.

Human Administration

"The Growing Emphasis in Human Administration" is the topic of N. J. Aiken, professor of business administration, Washington State College. Prof. Aiken also heads personnel management at the College and is well known for his work in helping the student adjust himself to the needs of his future employer.

On Saturday night the meeting will close with a big dinner-dance in the ballroom of the hotel.

SAE Coming Events

Aug. 16 – 17
West Coast Transportation & Maintenance Meeting
New Washington Hotel – Seattle, Wash.

■

Sept. 24 – 25
National Tractor Meeting
Schroeder Hotel – Milwaukee, Wis.

■

Oct. 14
Annual Dinner
Hotel Commodore – New York City

■

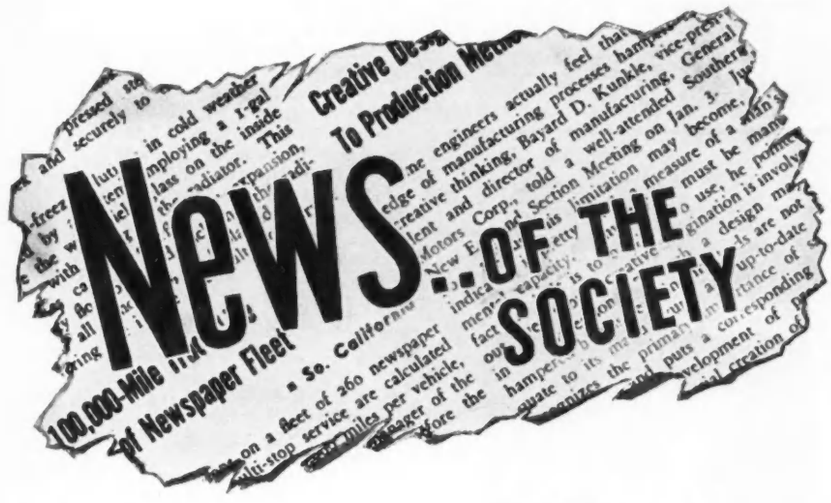
Oct. 31, Nov. 1 – 2
National Aircraft Production Meeting (and Engineering Display)
Hotel Biltmore – Los Angeles

■

November
Fuels & Lubricants Meeting
Tulsa, Okla.

■

Jan. 6 – 10, 1941
Annual Meeting (and Engineering Display)
Book-Cadillac Hotel – Detroit



System of Controlling Air Traffic Explained

■ So. California

How air traffic control makes better schedules and safety was discussed at the air transport meeting of the Southern California Section, June 14, by L. Ponton de Arce, traffic control superviser, sixth region, Civil Aeronautics Authority. The second paper, "Airplane Load Factor – What It Is and What It Means," by H. J. Stoneburner, chief engineer, Civil Aeronautics Authority, Santa Monica, Calif., explained airplane load factors and limitations to flight maneuvers which should be observed so that safe load factors will not be exceeded. More than 130 members attended the dinner-meeting which was held in Los Angeles.

Reporting that some four years ago there was little air traffic control in this country, or any other, Mr. de Arce told of the development of the government's system of air traffic control, based upon that devised by Earl F. Ward.

First installed as a cooperative undertaking at the Newark Airport, where 120 airline arrivals and departures were scheduled daily, under the direction of Mr. Ward, Mr. de Arce and Glenn Gilbert, now chief of the Air Traffic Control Section in Washington, the system later was adopted at Chicago and Cleveland, the speaker stated.

Government Takes Over

It soon became apparent, he added, that to carry out the plan successfully a large expenditure of money was needed, as well as increased personnel, and additional authority to control not only the scheduled airlines, but all planes operating within certain areas. At that time, he said, the government stepped in and took over the system, "lock, stock, and barrel," placing Mr. Ward at the head of the Airways Operation Division, which includes communication, airway traffic control, and airport traffic control.

Mr. de Arce emphasized that Airway Traffic Control Centers and Part 60 of the Civil Air Regulations are no attempt on the part of the Federal Government to restrict or retard ordinary flying. "Our chief concern," he stated, "is not how you fly, but rather when and where you fly, and, for that reason, it is essential that we maintain 100% cooperation between ourselves and the pilots. Without such cooperation there is a complete breakdown of our entire structure."

Continuing, Mr. de Arce gave in detail data on the control of flights along civil airways and around terminal airports. He also told of complicating factors and their remedies.

In closing, he noted that for the six months ending June, 1939, there were 2397 instrument landings made under the supervision of the 13 Airway Traffic Control Centers, and that approximately 1000 of these were made at the Oakland and Burbank Centers alone. The total number of flights handled in all kinds of weather at these two Centers, he reported, is estimated at around 300,000 operations for this fiscal year.

Much of the data presented by Mr. Stoneburner was based on data gathered to be incorporated in Civil Aeronautics Authority Bulletin No. 5, "Flight Instructor's Manual."

More SAE Men Named to National Defense Posts

Each week brings news of additional SAE members' appointments to National Defense posts.

ROBERT E. WILSON, president of Pan American Petroleum & Transport Co., American Oil Co., and subsidiaries, on June 21 was named consultant on petroleum problems to EDWARD R. STETTINIUS, JR., member of the National Defense Advisory Commission in charge of raw materials.

At the same time, ROBERT L. HALLETT, chief chemist, National Lead Co., was appointed specialist on tin.

Later in the month, ADMIRAL EMORY S. LAND, chairman of the U. S. Maritime Commission, was appointed by the NDAC to coordinate shipbuilding activities – merchant and naval – in association with the production division of the commission headed by WILLIAM S. KNUDSEN. Admiral Land's new duties will be in addition to his present responsibilities.

F. C. HORNER, assistant to chairman, General Motors Corp., has been selected as consultant to Ralph Budd, member of the commission in charge of transportation problems.

Colorado Members Hear Edwards on Lubricants

■ Colorado Club

"Lubrication" was the topic when members of the SAE Club of Colorado were addressed by James A. Edwards, president, Jesco Lubricants Co., at its June 4 meeting, in Denver. Mr. Edwards, whose offices are in Kansas City, also gave a short talk on building up of SAE membership, after he had presented his formal paper.

The meeting, which was held at the Oxford Hotel, will be the last one until fall. More than 20 were present.

John A. C. Warner, secretary and general manager of the Society, has been presented with a Certificate of Honorary Membership by the SAE Club of Colorado. Presentation was scheduled for a spring meeting, but as Mr. Warner was unable to attend, it was sent to him by mail.

Age Limit for Junior Members Extended to 33

The age limit for Junior members of the Society has been increased from 30 to 33 years by a recent amendment to Article C-10 of the Constitution.

This amendment, which becomes effective immediately, was first placed before the membership at the 1940 Annual Meeting in Detroit at the recommendation of the Council and Grading Committee. Its adoption was moved and seconded and, in accord with the Constitutional requirement, was later mailed to members. It was brought up for final discussion and amendment at the business session of the Summer Meeting, and in accordance to a vote cast by 20 members, later submitted by letter ballot to all members entitled to vote. Results of the ballot favored adoption of the amendment.

Article C-10 of the Constitution, as amended, reads: "C-10 Junior grade shall be composed of persons who at the time of election are under thirty-three years of age and qualified to fill subordinate engineering positions in the automotive or allied industries, or who are regularly enrolled students at or graduates of a technical school. A Junior member may upon reaching the age of twenty-six and shall upon reaching the age of thirty-three be transferred to Member or Associate grade, in accordance with the decision of the Council as to which grade his qualifications entitle him."

Banquet at G.M.I.

Holding its annual banquet, June 10, the SAE Student Branch at General Motors Institute heard H. P. Williams, retired Buick engineer, recall many interesting experiences in the early days of automotive engineering. Tracing engineering advances since the days that Buick manufactured two-cylinder engines, the speaker emphasized the important part played by standardization in the development of present-day cars.

About SAE Members

J. P. BLACK, managing director, Standard Motor Co., Ltd., Coventry, England, is resigning his position as Honorary Colonel of the 22nd Light Anti-Aircraft Regiment, Royal Artillery (T.A.). He was gazetted Aug. 12, 1939, before England was at war. Now, in view of the additional work and responsibilities he has undertaken on behalf of H. M. Government in his civilian capacity, he finds it impossible to continue to fulfill his duties called for by this appointment.

On June 12, **DR. ROBERT E. WILSON,** president, Pan American Petroleum & Transport Co., was awarded an honorary degree of Doctor of Engineering by the Polytechnic Institute of Brooklyn.

Among those returning from Europe on transatlantic Clippers early in July were SAE President **ARTHUR NUTT,** vice president for engineering, Wright Aeronautical Corp., Past-President **WILLIAM J. DAVIDSON,** General Motors Corp., and **JOHN J. IDE,** technical assistant in Europe, National Advisory Committee for Aeronautics.

Since July 1, **JEROME LEDERER** has been director of the new Safety Bureau of the Civil Aeronautics Board of the Department of Commerce, which has taken over the functions of the Civil Aeronautics Authority's Air Safety Board. Under him are the departments on safety rules and education and accident investigation. He also heads a division reviewing contested cases of air rules infractions. Since 1929 Mr. Lederer has served as chief engineer of Aero Insurance Underwriters, in which capacity he has been responsible for safety activities of an extremely varied nature, affecting airline, charter, and private flying.

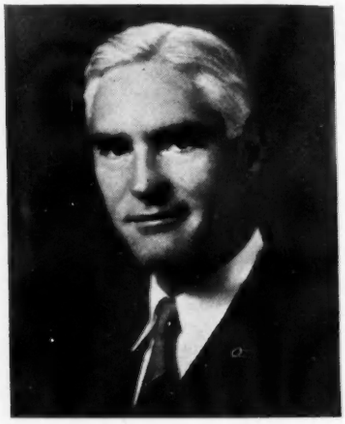
ROBERT INSLEY, until recently chief research engineer of Pratt & Whitney Aircraft, division of United Aircraft Corp., has been named vice president in charge of engineering by the Menasco Mfg. Co., Los Angeles.

Robert Insley
Menasco
Vice
President

Mr. Insley served as SAE vice president representing aircraft-engine engineering in 1934 and from 1932 to 1936 was chairman of the Aircraft Engine Division of the SAE Standards Committee. He has a wide background in aircraft engineering, having held important posts with United Aircraft & Transport Corp., Continental Aircraft Engine Co., and the U. S. Army Air Service before joining Pratt & Whitney Aircraft in 1934.

J. CARLTON WARD, JR., until recently vice president of United Aircraft Corp. and general manager of that company's Pratt & Whitney Aircraft division, was elected

President of Fairchild



J. Carlton Ward, Jr.

president of Fairchild Engine & Airplane Corp., July 11, at a regular meeting of the board of directors. This announcement was made by **SHERMAN FAIRCHILD,** who resigned as president to become chairman of the board. Mr. Ward recently returned from Paris on the *Yankee Clipper*. While there he attended the luncheon at the Air Ministry during which a German air-raid bomb fell close to the diners, but failed to explode.

Congress has authorized the issuance to **ORVILLE WRIGHT** of honorary aircraft pilot's license No. 1 in recognition of his outstanding service rendered to the science of aeronautics. The bill became a law when it was signed by President Roosevelt.

WILLIAM E. ROOTES, chairman, Rootes, Ltd., London, and president of Motor Manufacturers & Trades, Ltd., has been named chairman of England's Shadow Aero Engine Committee.

B. C. HEACOCK, president, Caterpillar Tractor Co., recently was appointed a regional vice-president of the National Association of Manufacturers.

H. M. RUGG, automotive engineer, Pennsylvania Grade Crude Oil Association, with offices in Detroit, recently completed a course of study at the Detroit Institute of Technology, receiving his degree of Bachelor of Science in Mechanical Engineering.

C. R. ALDEN, chief research engineer, Ex-Cell-O Corp., Detroit, received an honorary degree of Master of Science in Mechanical Engineering from the Detroit Institute of Technology on June 10.

HARRY J. SWANSON, vice president and treasurer of Ottawa Steel Products, Inc., Grand Haven, Mich., has announced his resignation from the company, and the sale of his interest to H. H. Nygren, his partner since 1924.

PROF. PAUL H. SCHWEITZER, Pennsylvania State College, announced the development of a new diesel-type engine adaptable for use in airplanes, in a paper presented before the Gas & Oil Power Division of the American Society of Mechanical Engineers, Asbury Park, N. J., June 21. The new motor, developed by Prof. Schweitzer and his associates at the college laboratory, is equipped with a tank of liquid oxygen. The oxygen, he said, would be injected into the air intake at take-off of the plane, increasing the efficiency of the engine for the critical period of take-off by about 33%.

RICHARD V. HICKS recently joined the engineering staff of Fram Corp., East Providence, R. I., as assistant chief engineer. He previously was test engineer in the engineering laboratory of the Chevrolet Motor Division, General Motors Corp., Detroit.

GEORGE H. FREERS recently was named to the engineering staff of the Marmon-Herrington Co., Indianapolis. After graduating from the Rose Polytechnic Institute, Mr. Freers served in the engineering departments of such firms as the Interstate Automobile Co., United States Motors, Packard Motor Car Co., Alden Sampson Truck Co., Marmon Motor Car Co., and the Stutz Motor Car Co. He is a past chairman of the SAE Indianapolis Section.

JOHN H. PRESTON has been named chief automotive engineer for Corrigan Osburne & Wells, Inc., an industrial engineering firm located in New York. He previously was automotive engineer with the National Carbon Co., New York.

D. W. RUSSELL has been named president of Airtemp Division of Chrysler Corp. Mr. Russell has been identified with Chrysler since 1931, engaged in technical sales work

Airtemp's New Chief

D. W. Russell

in the company's Fargo division of which he was named vice president in 1932.

CHARLES S. McCARTHY has joined the American Forging & Socket Co., Pontiac, Mich., as products engineer. He previously was affiliated with the Bingham Stamping Co., Toledo.

FREDERICK SELJE, formerly in charge of the design division of the Chrysler Corp., is director of art and design at the Plastics Industries Technical Institute, Los Angeles. The Institute, which will teach all phases of plastics manufacture including application, fabrication, design, research, and sales, will begin its first course on Sept. 16.

DR. WALTER L. O. MARCUS, formerly technical director and consulting engineer of the Renta Organization, Inc., Germany, and prior to that member of the board of directors, Horch-Works, Ltd., Germany, is technical manager and consulting engineer,

Dr. Walter L. O. Marcus In Switzerland

George Fisher Iron & Steel Works, Ltd., Schaffhausen, Switzerland. In 1939, Dr. Marcus and two assistants were in this country for three months, visiting machine-tool manufacturing plants.

RICHARD C. GAZLEY, former chief, technical development division, Civil Aeronautics Authority, is now affiliated with the Murray Corp. of America, Detroit.

ROBERT E. GROSS, president, Lockheed Aircraft Corp., has been named vice-president of the Los Angeles Airport Commission, in charge of development of Los Angeles' new municipal airport. Mr. Gross also is chairman of the Aviation Committee of the Los Angeles Chamber of Commerce.

WILLIAM G. CHAMBERLIN recently resigned from the Pennzoil Co. to become a member of the firm of Beswick & Britton, Los Angeles advertising agency specializing in automotive, industrial, and petroleum accounts.

In a statement made at an informal gathering, July 15, observing his 40th anniversary with the Goodyear Tire & Rubber Co., **P. W. LITCHFIELD,** president, urged: "that government take steps to immediately provide a nationalized emergency reserve of crude rubber up to 400,000 tons in excess of current commercial needs; that government take the lead in a program of conservation, including the collection of larger supplies of scrap rubber for reclaim and placing of an embargo on exports of crude or scrap; that encouragement be afforded moderate expansion of our facilities for the production of synthetic rubber; that the government appropriate for and encourage the development of rubber plantations in tropical Central and South America." He pointed out that we obtain 96% of our national rubber requirements from half-way round the world.

CHARLES F. KETTERING, vice president, General Motors Corp., has been named honorary chairman of the Detroit Meeting of the American Chemical Society, Sept. 9-13.

T. A. BOYD, head, fuel department, General Motors Research Laboratories, and **DR. GEORGE M. MAVERICK,** assistant manager, research and development division, Standard Oil Development Co., are members of an American Chemical Society Committee organizing a symposium on "Petroleum Chemistry's Contribution to the Automotive Field," as a part of the Detroit meeting.

MICHAEL B. COMBERIATE, formerly in the engineering department, equipment group, Glenn L. Martin Co., Baltimore, has joined the National Advisory Committee for Aeronautics, Langley Field, Va., as a junior aeronautical engineer in the aero-engine research laboratory.

W. C. BRAY, heretofore manager of truck and bus tire sales, B. F. Goodrich Co., Akron, has been named assistant sales manager of the company's tire division.

VAN WYCK HEWLETT is doing experimental engineering drafting with the Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J.

LEONARD OCHTMAN, formerly mechanical engineer in charge of development and assistant to the chairman of the board, Curtis Mfg. Co., St. Louis, has joined the engineering department of the Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J.

L. P. SAUNDERS, chief engineer of research, Harrison Radiator Division, General Motors Corp., Lockport, N. Y., has been elected a director of the Niagara County Chapter of the New York State Society of Professional Engineers.

H. M. BRAMBERRY, Perfect Circle Co., Hagerstown, Ind., writes that he is "back on the job and feeling fine" after spending some time in California recuperating from an illness.

HENRY FORD was recipient of the James Watt International Medal at a dinner in Detroit, June 25. This award, considered one of the highest honors in engineering, was conferred upon Mr. Ford by the British Institution of Mechanical Engineers in 1938. Plans were made for the presentation of the medal in London last year. This, however, was made impossible by the war and the British Institution asked that the American Society of Mechanical Engineers, which had nominated Mr. Ford for this honor, arrange the presentation.

WALTER A. HAMILTON, chief, division of materiel, Douglas Aircraft Co., Santa Monica, Calif., has been elected to the company's board of directors.

FOSTER N. PERRY recently was named vice president in charge of sales by the American Bosch Corp., Springfield, Mass. He previously was general sales manager of the company. Mr. Perry has been associated with the company since 1924, the year of his graduation from M.I.T.

WILLIAM A. F. MILLINGER has been promoted from captain to major in the Air Corps Reserve. Major Millinger is secretary of the SAE Southern California Section. He is located in Los Angeles.

W. E. SHIVELY recently celebrated the 25th anniversary of his affiliation with the Goodyear Tire & Rubber Co. He is manager of tire design, a post he has held since 1924.

United Aircraft Assigns Chatfield, Caldwell, and Martin to New Offices

ON July 1, the United Aircraft Corp. announced the appointment of **Charles H. Chatfield** as executive assistant to the vice president. **Frank W. Caldwell** succeeded Mr. Chatfield as director of research, and **Erle Martin** was assigned to Mr. Caldwell's former post as engineering manager of the corporation's Hamilton Standard Propellers division.

Prior to his appointment, Mr. Chatfield had been director of research since 1935, and for six years before that was aeronautical engineer for the Pratt & Whitney Aircraft division. He has long been active in the SAE and in 1935 was vice president of the Society representing the Aircraft Engineering Activity.

Frank W. Caldwell Director of Research

Mr. Caldwell has been identified with the Hamilton Standard Propellers division for the past 11 years, first as chief engineer and, since 1935, as engineering manager. A noted inventor and designer, he was responsible for the development of the controllable-pitch propeller which won for Hamilton Standard the Collier Trophy in 1933. He was awarded the Sylvanus Albert Reed Award in 1935 for his work in propeller design and development.

Charles H. Chatfield New Executive Post

Since 1935, Mr. Martin has been chief engineer of Hamilton Standard, which he joined in 1930. He worked in close collaboration with Mr. Caldwell in development of controllable-pitch and constant-speed propellers, and was largely responsible for the development of the now widely-used quick-feathering type.

Messrs. Chatfield and Caldwell are graduates of M.I.T. Mr. Martin was graduated from Pennsylvania State College.

JOHN COLTMAN has joined John Marston, Ltd., branch of Imperial Chemical Industries, Ltd., Wolverhampton, England, as development engineer. Prior to taking this position he was resident engineer, Turf Development Board, Ltd., Clonsast Works, Laoighis, Irish Free State.

LUTHER HARRIS, heretofore superintendent of maintenance, Pennsylvania-Central Airlines Corp., Pittsburgh, has been

Maintenance V.P.

Luther Harris

named vice president of the company in charge of maintenance.

OSCAR C. THOMAS, formerly instruction book writer, Cleveland Diesel Engine Division, General Motors Corp., has been transferred to the General Motors Overseas Operation division as diesel service engineer. His headquarters are in Detroit.

WALTER A. HAMILTON, chief of material and director, Douglas Aircraft Co., is vice president of the Pacific Aviation Club which recently moved into its permanent home, the former Grand Hotel, on the ocean front at Santa Monica, Calif. **CARL B. SQUIER,** vice president, Lockheed Aircraft Corp., and **RICHARD MILLAR,** president, Vultee Aircraft Co., are members of the club's board of directors.

R. C. LOOMIS, formerly research engineer, Standard Oil Co. of Calif., is engineering pilot and project engineer with Transcontinental & Western Air, Inc., Kansas City, Mo.

Since July 1, **ROBERT A. OHLBAUM** has been in the engineering department of the Glenn L. Martin Co., Baltimore. Previously he was inspector with the Cutler-Hammer Mfg. Co., N. Y.

IRWIN K. WEISS, former junior engineer with the Atlantic Refining Co., Philadelphia, is engineer in the test department of Mack Mfg. Corp., Allentown, Pa.

EUGENE ROTH has been named assistant engineer with the Sunbeam Electric Mfg. Co., Evansville, Ind. He previously was chief engineer, Stant Mfg. Co., Connersville, Ind.

E. A. STALKER, chairman, department of aeronautical engineering, University of Michigan, Ann Arbor, Mich., and **E. E. LeVAN,** vice president, Haynes Stellite Co., Kokomo, Ind., presented papers at the Summer Meeting of the American Society of Mechanical Engineers, Milwaukee, June 17-20.

ROBERT E. GROSS, president, Lockheed Aircraft Corp., Burbank, Calif., has announced a cooperative program with the California Institute of Technology in organizing an aircraft engineering course designed to adapt men with general engineering training to the specialized requirements of the aviation industry. The men, he said, will be assembled by the Lockheed company, which will pay their expenses and a salary during the course. At the expiration of an intensive eight-week training period at C.I.T. and an additional eight weeks at the company's plant, Mr. Gross revealed, the men will be guaranteed employment with Lockheed at a stated salary.

M. O. JEFFERSON, who previously was in charge of automotive and industrial engineering of the Albany, N. Y., division, Socony-Vacuum Oil Co., Inc., has been named engine builders representative (Lubrite and White Eagle divisions) at St. Louis, Mo.

WILLIAM B. SEAVER, formerly graduate assistant at Yale University, is now with the Ethyl Gasoline Corp., Detroit.

ROBERT W. PRATT, who recently received his S.M. and S.B. degrees from Massachusetts Institute of Technology, where he was a member of the SAE Student Branch, has joined Pratt & Whitney Aircraft, East Hartford, Conn., as experimental test engineer.

JACK MUNROE, JR., formerly junior engineer with the Truck Trailer Mfg. Co., Denver, Colo., is now affiliated with the White Motor Co., Cleveland.

New TWA Vice President

D. W. Tomlinson, chief engineer and "overweather" research flier for Transcontinental & Western Air, Inc., has been elected vice president in charge of engineering for the airline, a newly created post announced by the TWA board of directors on June 11.

Mr. Tomlinson, who has been flying for more than 20 years, joined the TWA in 1929 and was placed in charge of its experiments on "overweather" flying five years ago.

In addition to his commercial transport engineering work, he has been active in the U. S. Naval Reserve, holding the commission of Commander of Naval Reserve Squadron VS-12 at Kansas City.

LEONARD DOPPEL, formerly engineer with the Niagara Cab Co., Inc., New York, has been named maintenance supervisor of Cornelia Cab Co., Inc., of the same city.

JAMES THOMAS-STAHLE, formerly a member of the SAE Student Branch at Massachusetts Institute of Technology, is engineer in the B-K vacuum power division of Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

EUGENE W. KETTERING'S collection of 380 scale models of world-famed aircraft is being exhibited at the General Motors New York World's Fair exhibit. The tiny planes, outgrowth of a 14-year hobby of Mr. Kettering, engineer, Electro-Motive Corp., a GM subsidiary, are said to be the most valuable aggregation of the kind ever assembled. The collection includes replicas in the scale of 5/32 in. per ft, of aircraft dating from the original Wright bi-plane to today's Douglas, Boeing, Curtiss, Martin, and Seversky models.

About Authors

(*Concluded from page 9*)

to chief metallurgist. Due to the close relationship between the metallurgy of the part and the choice and application of the abrasive in Superfinishing, Mr. Hemingway has been assigned to direct the experimental and development work for this process.

■ **WILLIAM S. JAMES** *(M '18), Studebaker's chief engineer, was SAE vice-president representing the Passenger-Car Engineering Activity in 1937. He has participated in the work of numerous SAE committees, and this year represents the Passenger Car Activity on the Membership Committee, serves on the General Research Committee and several of its committees, and is a member of the Brake Committee, the Lubricants Division of the Standards Committee, and the Cooperative Fuel Research Committee. He also represents the SAE on Committee D-11 on Rubber Products of the American Society for Testing Materials and several of its subcommittees. Mr. James joined Studebaker as a research engineer in 1927. He previously had been assistant technologist with the Associated Oil Co., and was for eight years with the United States Bureau of Standards as assistant physicist, associate physicist, and physicist. He started with the Bureau while still working for his B.S. degree in Mechanical Engineering at George Washington University, from which he was graduated in 1917.*

■ **D. W. SHERMAN** *(M '35) during the past 16 years has spent a considerable portion of his time on research covering design and performance of the automobile frame; this work being carried on in collaboration with automobile manufacturers. Many of the basic design features in the modern chassis frame were developed under his supervision, and he is well known in the Detroit area for his accomplishments in this direction. Mr. Sherman has been affiliated with the A. O. Smith Corp., of which he is chief engineer in charge of their automotive division, since 1923.*

Seeks Nomination

RALPH E. FLANDERS, president, Jones & Lamson Machine Co., Springfield, Vt., and director in other industrial concerns, on July 16 announced his candidacy for the Republican nomination for the seat in the United States Senate vacated by the death of Vermont Senator Ernest W. Gibson. Mr. Flanders is a member of the State Planning Board and chairman of the Vermont Committee on Interstate Flood Compacts.

KINGSLAND HOBEIN, formerly engineering assistant, Curtiss-Wright Corp. at Washington, D. C., has joined the Wright Aeronautical Corp., Paterson, N. J., as engineer.

HAROLD R. Le BLOND, who was president of the Ahrens-Fox Fire Engine Co., Cincinnati, heads the recently organized Le Blond Engineering Co., of Norwood, Ohio, manufacturers of machine tools.

C. W. MacMILLAN, development engineer, Hinckley-Myers Co., division of Kent-Moore Organization, Inc., has been transferred from Detroit to Jackson, Mich.

CHARLES LEVY is junior layout draftsman with the Vega Airplane Co., Burbank, Calif.

JOHN P. GOBETTI, formerly assistant development engineer, Johns-Manville Corp., Manville, N. J., has joined the Glenn L. Martin Airplane Co., Baltimore.

E. G. PATTEN, formerly in the service, flat rate, and tools department, Pontiac Motor Division, General Motors Corp., at Denver, Colo., has been transferred to the Minneapolis, Minn., zone office of the company, as zone service and complaint adjuster.

STEPHEN M. BATORI has been named New England regional superviser of automotive equipment for the Sun Oil Co., with headquarters in Boston. Mr. Batori previously was automotive engineer with the Connecticut Railway & Lighting Co., Bridgeport.

ROBERT L. HARTLEY, formerly a member of the SAE Student Branch at Purdue University, is working for the Cooper-Bessemer Corp., Mt. Vernon, Ohio.

L. G. DENNING, a recent graduate from the U. of Wisconsin, is in the engine testing laboratory of the Sinclair Refining Co., East Chicago, Ind. **A. J. KINAST,** another Wisconsin graduate, is with the Barber-Colman Co., Rockford, Ill., taking a training course in the machine tool division of the Engineering department.

Two recent Yale graduates, student members of the Society, have reported affiliations. **ALF HUNDERE** is research engineer with the Standard Oil Co. of Calif., and **DONALD D. PASCAL** is junior engineer with Pratt & Whitney Aircraft, East Hartford, Conn.

V. D. POHLMEYER, formerly a student member at the University of Detroit, has joined the engineering department at Wright Aeronautical Corp., Paterson, N. J.

WILLARD PARKER has joined the engineering department of the Curtiss Propeller Division, Curtiss-Wright Corp., Clifton, N. J. He previously was a student at the University of Minnesota.

TelAutograph Corp., New York, has announced the appointment of **G. TAYLOR STANTON** to the position of chief engineer. He assumes full responsibility for all technical activities and services, including engineering research and development. Mr. Stanton was formerly manager of industrial applications for Electrical Research Products, Inc., New York. He is the designer of the sound system in General Motors' Futurama at the New York World's Fair.

PAUL BOOTH is vice president of the Republic Machinery Co., Indianapolis, Ind.

GEORGE H. SCHOENBAUM has been assigned for active duty in the office of the Chief of Ordnance, U. S. Army, Washington, D. C. Mr. Schoenbaum, who was formerly engineering representative for Esso Marketers in Washington, had recently been transferred to Detroit as resident automotive engineer for the Standard Oil Co. of N. J.

PERRY A. CLARK, formerly a member of the SAE Student Branch at Purdue University, is a student engineer at Pratt & Whitney Aircraft, East Hartford, Conn.

LEON E. LOUDERMILK, recent graduate from the University of Oklahoma where he was a member of the SAE Student Branch, is affiliated with the National Supply Co., Seminole, Okla.

Obituaries

John Swinscoe

John Swinscoe, design engineer, Menasco Mfg. Co., Los Angeles, died June 10 at the age of 59. He had been a member of the SAE since 1911.

Born and educated in England, Mr. Swinscoe came to this country in 1909, having had five years experience as chief draftsman in an automatic machinery plant. He started in that year with the American Locomotive Co., designing jigs and tools for automotive parts. He soon transferred to the Driggs-Seabury Ordnance Corp. as chief draftsman and was later chief engineer.

Mr. Swinscoe held a number of engineering posts with the General Motors Corp. and its subsidiaries after leaving Driggs-Seabury, having been affiliated with Buick; manufacturing engineer with Olds; chief engineer of Brown-Lipe-Chapin; and plant engineer of Frigidaire plant No. 2. He joined Menasco in 1937.

Robert E. Fries

Robert E. Fries, vice president, director, and part owner of L.G.S. Spring Clutches, Inc., Indianapolis, died May 25 at his residence in Cleveland at the age of 53.

Mr. Fries, who first became a member of the SAE in 1913, was well known in the industry. Prior to his affiliation with the L.G.S. organization he had been associated for 23 years with the Columbia Axle Co., Cleveland, of which he was president. Earlier he had been affiliated with Timken Roller Bearing Axle Co., R.C.H. Corp., Lozier Motor Co., Weston-Mott Co., and Columbia Buggy Co.

He was born in Canton, Ohio, and attended Ohio State University.

Harry T. McDonald

Harry T. McDonald, research engineer, Caterpillar Tractor Co., died of heart disease at his home in Peoria, Ill., June 3.

Mr. McDonald, who was born in Peoria 48 years ago, attended public school in that city, and studied for two years at the College of Engineering, Bradley Polytechnic Institute.

He had for 22 years been affiliated with the Caterpillar company and its predecessors, starting as designer with the Holt Mfg. Co. Earlier he was draftsman and designer with the Bartholomew Co., and had worked in the foundry of the Avery Co.

Mr. McDonald became a member of the SAE in 1921. From 1933 to 1936 he was a member of the SAE Ordnance Advisory Committee, and since then had been an alternate.

George M. Kryder

George M. Kryder, for many years manager of the truck and bus tire department, Firestone Tire & Rubber Co., Akron, Ohio, died June 11 following a long illness. He was 46 years old.

Mr. Kryder, who had previously been in charge of production planning, joined the Firestone organization in 1915. He was born in Akron, attended public schools of that city, and studied at the Case School of Applied Science. He became an associate member of the Society in 1925.

Robert M. Pierson

Robert M. Pierson, Akron, Ohio, patent attorney who had been a member of the SAE since 1927, died in the middle of May. He was 65 years old.

Rutgers College granted Mr. Pierson his B.S. degree in 1896 and he immediately became affiliated with a firm of patent attorneys in Boston. At different times between 1904 and 1912 he was a partner in the firms of Bentley & Pierson and Beach & Pierson, New York patent attorneys. Later he became patent counsel and legal consultant on rubber products for the B. F. Goodrich Co., and established offices in Akron.

Mr. Pierson specialized on carburetors and hot-spot manifolds, and held a number of patents on internal-combustion engines, their parts, and equipment.

John B. Sanborn

John B. Sanborn, executive engineer, Pratt & Whitney Aircraft, Division of United Aircraft Corp., died suddenly in Farmington, Conn, June 29. He was 46 years old. Funeral services were held July 1. SAE members Earle A. Ryder and Andrew V. D. Willgoos were pallbearers.

Mr. Sanborn was in charge of the experimental division of Pratt & Whitney and had been associated with United Aircraft since 1928. Before joining United Aircraft, he was affiliated with the Kurz-Kasch Co., Cutler Hammer Mfg. Co., Hanna Engineering Works, Detroit Steel Products Co., and Budd Wheel Corp.

Shortly after becoming a member of the SAE in 1939, Mr. Sanborn was appointed to the Aircraft Engine Division of the Society's Standards Committee. This year he was vice-chairman of the division.

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between June 15, 1940, and July 15, 1940.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section

LONG, RAYMOND THOMAS (M) superintendent, automotive maintenance, Sherwood Bros., Inc., Baltimore Trust Bldg., Baltimore.

SCHRADER, ALAN RICHARD (J) assistant mechanical engineer (diesel), U. S. Navy, U. S. Naval Engineering Experiment Station, Annapolis, Md.

Canadian Section

WARGIN, LEO ALEXANDER (A) president, Acme Bearings & Parts, Ltd., 49-51 Charles St., E., Toronto, Ont.

Chicago Section

ERMINGER, DURWARD B. (A) assistant manager, International Harvester Co., 180 N. Michigan Ave., Chicago.

JOLLY, JAMES NICOLL (A) departmental manager, Williams, Hunt & Johnston, Ltd., P. O. Box 1076, Cape Town, South Africa. (mail) c/o Diamond T Motor Car Co., 431 S. Dearborn St., Chicago.

KLEIS, JOHN D. (M) research physicist, Fansteel Metallurgical Corp., 2200 Sheridan Rd., North Chicago, Ill.

Cleveland Section

ENDRESS, CLARENCE H. (M) electrical engineer, Willard Storage Battery Co., 246 E. 131st St., Cleveland.

Detroit Section

BIFANO, MICHAEL (J) president, chief engineer, Bifano-Johnstone Aircraft Co., 2847 Grand River Ave., Detroit. (mail) 2000 Scott St.

CAHILL, ROBERT JOHN (J) junior engineer, 12561 Third Ave., Highland Park, Mich.

CROTTY, WILLARD E. (A) assistant sales manager, Detroit Gasket & Mfg. Co., 12640 Burt Rd., Detroit.

DANSE, L. A. (M) chief metallurgist, Cadillac Motor Car Division, General Motors Sales Corp., Detroit.

DEFEZZY, ALBERT (M) designing engineer, General Motors Corp., Detroit Diesel Engine Division, 13400 W. Outer Drive, Detroit.

GAY, ERROL J. (M) manager, national fleet sales, Ethyl Gasoline Corp., 723 E. Milwaukee Ave., Detroit.

JOHNSON, EDWARD TERHUNE (M) chemist, Chrysler Corp., Engineering Department, Highland Park, Mich.

KRESS, RALPH H. (M) Chevrolet Motor Division, General Motors Corp., Detroit (mail) Chevrolet Central Office, Office No. A-55.

MCCARTY, JOHN E. D. (M) spark plug engineer, Firestone Rubber & Metal Products Co., Wyandotte, Mich.

SMITH, DANIEL WILLIAM, JR. (A) sales engineer, Evans Products Co., 15310 Fullerton, Detroit.

Indiana Section

MITCHELL, WALTER J. (FM) technical manager, Automotive Products Co., Ltd., Brock House, Langham St., London, W. 1. England. (mail) c/o Marmon-Herrington Co., Indianapolis, Ind.

Kansas City Section

VANCIEL, M. LLOYD (A) tune-up engineer, Ethyl Gasoline Corp., 1917 Buchanan St., North Kansas City, Mo.

Metropolitan Section

BLOOD, WILLIAM EVANS (A) president, Aero Spark Plug Co., Inc., 635 Greenwich St., New York City.

BRICE, PHILIP EDGAR ROWLAND (J) engineer, Republic Aviation Corp., Farmingdale, L. I., N. Y. (mail) 125 Avon Place, Amityville, L. I., N. Y.

CAMP, THOMAS L. (A) head, mechanical test department, Permatex Co., Inc., 1720 Ave. Y, Sheepshead Bay, Brooklyn, N. Y.

CHURCH, FRANCIS G. (M) technical supervisor, National Carbon Co., Room 1307, 30 E. 42nd St., New York City.

CLAPPER, HOMER W. (J) test engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) Beech Terrace, Pines Lake, R.F.D. No. 1.

HARRISON, WILLIAM THAYER (J) junior test engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) 204 Lorraine Ave., Upper Montclair, N. J.

HUNTER, DAVID ULRICH (J) senior stress analyst, Wright Aeronautical Corp., Paterson, N. J. (mail) Black Rock Terrace, Erskine Lakes, Wanaque, N. J.

JAROS, ZYGMUNT (J) experimental tester, Wright Aeronautical Corp., 132 Beckwith Ave., Paterson, N. J. (mail) 45-14 42nd St., Long Island City, N. Y.

JETT, EDWARD C. (J) project engineer, Ranger Engineering Corp., Farmingdale, L. I., N. Y. (mail) R.F.D. No. 2, Huntington, N. Y.

KITTREDGE, JOHN M. (M) assistant project engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) 641 E. 27th St.

LOWMAN, DONALD E. (J) draftsman, Wright Aeronautical Corp., Paterson, N. J. (mail) 776 Goffle Road, Hawthorne, N. J.

MOORE, WILLIAM HAMPTON (J) project engineer, Ranger Engineering Corp., Farmingdale, L. I., N. Y. (mail) 18 Cedar Ave.

OLSON, ELDEN H. (J) senior test engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) Garside Ave., R. D. No. 3.

SCOTT, WINTHROP GLOVER (J) test engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) 364 S. Irving St., Ridgewood, N. J.

SMITH, JEAN S. (J) public relations assistant, Wright Aeronautical Corp., Paterson, N. J. (mail) 485 Broadway.

WEBB, CLARENCE B., JR. (J) foreman, heat treating, Ranger Engineering Corp., Farmingdale, L. I., N. Y. (mail) 21 California Ave., Hempstead, L. I., N. Y.

ZAHODIAKIN, VICTOR F. (M) president, Z-Flex Piston Ring Corp., 250 W. 54th St., New York City.

Milwaukee Section

O'HARROW, CHARLES TRUMAN (M) Allis-Chalmers Mfg. Co., West Allis, Wis. (mail) 2376 N. 59th St., Milwaukee.

POST, FORREST K. (A) service manager, Twin Disc Clutch Co., Racine, Wis. (mail) 1317 N. Broadway, Milwaukee.

WILKIN, ELLSWORTH D. (M) designing engineer, Waukesha Motor Co., Waukesha, Wis. (mail) 519 Bethesda Court.

Philadelphia Section

BOROWSKY, F. GORDON (A) vice president, George K. Garrett Co., Inc., Philadelphia (mail) 1421 Chestnut St.

CLUFF, HARRY MONROE (A) automotive service engineer, National Carbon Co., Inc., 30 E. 42nd St., New York City. (mail) 1821 St. Mary's St., Raleigh, N. C.

SIMS, JOHN C., JR. (J) Baldwin Locomotive Works, Engineering Department, Philadelphia. (mail) 109 W. Willow Grove Ave., Chestnut Hill.

Pittsburgh Section

HUGHES, CHARLES M. (A) vice president, S & R Grinding & Machine Co., 5706 Harvard St., E.E., Pittsburgh.

St. Louis Section

RIPPIE, CHARLES W. (M) petroleum technologist, Solvay Sales Corp., St. Louis, Mo. (mail) 3615 Olive St.

Southern California Section

BENBOW, L. L. (A) instructor, National Schools, 4000 S. Figueroa, Los Angeles.

BOMER, EDGAR T. (J) draftsman, Lockheed Aircraft Corp., Burbank, Calif. (mail) 506 N. Palm Ave.

FABER LABORATORIES, INC. (Aff.) 1760 E. 15th St., Los Angeles. Reps: Faber, Ralph L., president, general manager, New York City; Faurot, Glenn U., branch manager, San Francisco; Heard, George, middlewest branch manager, Chicago; Perriguey, Wilbur G., eastern branch manager, New York City; Seiter, Dudley H., northwest branch manager, Seattle, Wash.; Stewart, Clifford R., western branch manager.

SWENSSON, MALTE (M) hydraulic engineer, Douglas Aircraft Co., Inc., Santa Monica, Calif. (mail) 2028A Euclid Ave.

Southern New England Section

BISCHOFF, WALDEMAR OTTO (J) checker, engineering department, Pratt & Whitney Aircraft, Division of United Aircraft Corp., East Hartford, Conn. (mail) 113 Westfield Rd., Holyoke, Mass.

NYSTROM, CARL HARRY (M) designer, American Bosch Corp., 3664 Main St., Springfield, Mass. (mail) 207 Dunmoreland St.

Syracuse Section

KENERSON, CHARLES J. (A) vice president, general manager, treasurer, Morse Chain Co., Division of Borg-Warner Corp., Ithaca, N. Y.

Washington Section

POWK, JOHN EDWARD (A) airplane and engine mechanic, Eastern Airlines, Inc., Arlington, Va.

Outside of Section Territory

FRIDERICI WAYNE J. (M) chief engineer, Standard Products Co., Port Clinton, Ohio; (mail) 522 Monroe St.

LINES, A. W. (A) president, Accuralite Co., P. O. Box 357, Muskegon, Mich.

SNYDER, LEO ANDREW (A) vice president, sales, Champlin Refining Co., Enid, Okla. (mail) P. O. Box 1078.

SROGI, LADISLAW GERARD (J) draftsman, Lycoming Division, Aviation Mfg. Corp., Williamsport, Pa. (mail) 56 Brandon Place.

VON ELM, H. S. (A) president, Oklahoma Tractor & Equipment Co., Oklahoma City, Okla. (mail) 1900 Linwood Blvd.

Foreign

HALL, ROBERT ARNOLD (F M) research engineer, British Overseas Airways Corp., Airways House, London, S.W. 1, England (mail) 1 Mayfield Rd., Wimbledon, S.W. 19, England.

MJELLEM, ODD (A) director, Odd Mjellem A/S, Kong Oscars gt. 23, Bergen, Norway.

SALTER, EDWARD GEO. (F M) transport superintendent, Transport Department, Travancore State, South India.

WOOD, REGINALD V. (F M) works manager, Tool Equipment Co., Pty., Ltd., 47 Bridge Rd., Glebe, Sydney, N.S.W., Australia.

APPLICATIONS Received

The applications for membership received between June 15, 1940, and July 15, 1940, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Canadian Section

GAMMAGE, JOHN EDWIN, sales manager, Hayes Steel Products, Ltd., Merritton, Ont., Canada.

MACINNIS, EDWARD H., director of sales, E. F. Houghton & Co. of Canada, Ltd., Toronto, Ont., Canada.

Chicago Section

DETERS, JOHN F., fuels research, Standard Oil Co. (Ind.) Whiting, Ind.

EDDY, FRANKLIN O., research engineer, Standard Oil Co. (Ind.) Whiting, Ind.

Cleveland Section

CAMPBELL, M. H., automotive engineer, Standard Oil Co. (Ohio), Chemical Research Department, Cleveland.

GRAVLEY, CHARLES K., chief engineer, Brush Development Co., Cleveland.

JONES, BERNARD ALAN, spark plug engineer, Firestone Tire & Rubber Co., Akron, Ohio.

PRASSE, HERBERT F., draftsman, Thompson Products, Inc., Cleveland.

Dayton Section

BENT, A. J., representative in charge of Cincinnati district, Bendix - Westinghouse Automotive Air Brake Co., Cincinnati, Ohio.

Detroit Section

BERNTHAL, ARTHUR FREDERICK, metallurgist, Bundy Tubing Co., Detroit.

CRANDALL, WILLIAM J., engine designer, Packard Motor Car Co., Detroit.

DOWNING, ROBERT EMMET, cost engineer, Packard Motor Car Co., Detroit.

HALL, WILLIAM EDWIN, sales engineer, Harris Products Co., Detroit.

ROSE, HAROLD E., cushion spring engineer, Fisher Body Division, General Motors Corp., Detroit.

SANDERS, RUSSELL F., special test engineer, Chevrolet Motor Division, General Motors Corp., Detroit.

SHATAGIN, JOHN T., body designer, Edward G. Budd Mfg. Co., Detroit.

Metropolitan Section

BRALEY, W. H., field engineer, Peter A. Frasse & Co., Inc., New York.

CRAGIN, ROBERT B., chemical engineer, The M. W. Kellogg Co., New York.

ENGEL, WERNER H. E., 23 Ingraham St., Brooklyn, New York.

GOMEZ, RICHARD R., draftsman, Aircraft Screw Products Co., Inc., Long Island City, N. Y.

GONDECK, FRANK J., shop foreman, Layng & Co., Inc., Springfield, N. J.

PERKINS, KENDALL, research engineer, American Airlines, Inc., New York Municipal Airport, New York.

POLAK VAN OVERVEEN, J., Appel & Englander, New York.

Milwaukee Section

STERNBERG, ERNEST R., sales engineer, Sterling Motor Truck Co., Inc., Milwaukee.

New England Section

HILL, FREDERICK W., engineer, The Frank M. Hill Machinery Co., Inc., Walpole, Mass.

Northern California Section

PANELO, PEDRO D., mechanical engineer, 314 L St., Sacramento, Calif.

Northwest Section

TOMPKINS, CHARLES SANFORD, inspector, Boeing Airplane Co., Seattle, Wash.

Philadelphia Section

GLIDEWELL, HAROLD C., service representative, Hall Scott Motor Car Co., Philadelphia.

ULLBERG, FREDERICK, JR., publicity, Edward G. Budd Mfg. Co., Philadelphia.

Pittsburgh Section

LAZOR, AL, manager, United Carburetor Service, Pittsburgh.

MANSFIELD, ALBERT T., commercial manager, McKinley Gregg Automobile Co., Pittsburgh.

MURPHY, THOMAS G., chief chemist, Franklin Creek Refining Corp., Franklin, Pa.

WEBB, CHARLES C., chief engineer, Wheeling Stamping Co., Wheeling, W. Va.

Southern California Section

DALTON, LEONARD M., inspector of Coast Guard Aircraft, U. S. Coast Guard, Los Angeles, Calif. mail: Pacific Airmotive, Union Air Terminal, Burbank, Calif.

EDMISTON, ALTON CARL, development work, layout department, Ryan Aeronautical Co., San Diego, Calif.

MASTERS, IRVIN W., manager, Los Angeles branch, The Flex-O-Tube Co., Los Angeles.

SHARP, F. HERBERT, engineer, wing group, Consolidated Aircraft Corp., San Diego, Calif.

WEIDINGER, ALOIS MARTIN, chief instructor of engines, Ryan School of Aeronautics, Lindbergh Field, San Diego, Calif.

WHITE, PAUL H., JR., assistant to president, Menasco Mfg. Co., Los Angeles.

Southern New England Section

SELAN, JOSEPH S., test operator, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn.

STRAM, GEORGE H., designer, Wolverine Motor Works, Inc., Bridgeport, Conn.

Syracuse Section

FENNER, LOUIS M., R. D. No. 3, Syracuse, N. Y.

Washington Section

ENGELMANN, GEORGE E., special representative, Studebaker Corp., Washington, D. C.

Outside of Section Territory

FORNASERO, JAMES B., sales engineer, pilot, Continental Motors Corp., Muskegon, Mich.

GREIG, JAMES GORDON, traffic manager, Albany Packing Co., Albany, N. Y.

LURA, LOREN E., engineer, Minneapolis Moline Power Implement Co., Minneapolis, Minn.

NOBLE, L. B., chemist, Southwest Grease & Oil Co., Wichita, Kansas.

Foreign

FLANNERY, MATTHEW A., manager, truck division, General Motors South African, Ltd., Port Elizabeth, S. A.

Credit to R. C. Alden

In the July SAE Journal credit should have been given to R. C. Alden for the chart, "10 Years of the Octane Number Race," which appeared on page 37 in David Beecroft's article, "The Next 35 Years." The chart is based upon one prepared by Mr. Alden as a part of his paper, "Antiknock Requirements – Today and Tomorrow," presented before the American Petroleum Institute's marketing division in Chicago, April 22. It also was reproduced in the April 24 issue of *National Petroleum News*, page 13.

SAE Papers in Digest

HERE are digests of papers presented at various meetings of the Society. Some of these papers may be printed in full in the SAE Journal.

Mimeographed copies of all papers received will be available, until current supplies are exhausted, at a cost of 25 cents per copy to members; and at 50 cents per copy to non-members, plus 2% sales tax on those delivered in New York City. Orders for mimeographed copies must be accompanied by remittance and should be addressed to Sessions Secretary, Society of Automotive Engineers, 29 West 39th St., New York.

National Transportation Meeting
St. Louis, Mo., Oct. 26-27, 1939

(Concluded from SAE Journal, March, 1940, p. 30)

Two-Speed Axles – J. R. Bartholomew, Eaton Mfg. Co.

AS a fundamental, the author assumes that there is a need for a wider range of gear ratios than offered by the production axle and transmissions.

He then gives the reasons for using the two-speed axle to gain this wider range of ratios; describes the various two-speed axles which have been used; and includes a detailed description of the Eaton two-speed axle.

The two-speed axle, he contends, provides the wider ratio range with a minimum of changes in the production chassis; the low gear of the axle does not put any additional load on the transmission, driveshaft, universal joints, and axle bevel gears. The two-speed axle, he continues, is quiet in both ratios and may be run in either ratio with any transmission gear.

Multispeed Transmissions – C. D. Peterson, Spicer Mfg. Corp.

AN outline of methods of securing multispeed and wide ratio spread for motor trucks by compounding gearing of transmissions mounted as unsprung weight in chassis above the plane of the driving axle, is presented in this paper.

The majority of trucks above the light-delivery class carry four or five-speed transmissions, direct on fourth overdrive on fifth, or direct on fifth speed. Although these three types fulfill the requirements of ordinary service conditions, a wide spread of gear ratios is required to give high starting and hill-climbing torque, as well as to permit high vehicle speed on the highways. The performance wanted of a truck should control how the gearing should be compounded to give the desired multispeed range.

Ratios and arrangement of the most popular transmissions which compound gears are given and discussed. Two gear shift levers are needed to operate all the compounded transmission arrangements covered, as it is necessary to shift each transmission independent of the other.

Factors in Engine Wear – F. L. Faulkner, Armour & Co.

THIS paper discusses the subject of engine wear under four subdivisions: design influence; manufacturing influence; operating influence; and chemical influence. Referring to the first, design influence, the author contends that neither engines of a given manufacture nor of different manufacture of the same size and same year model deliver a definite life expectancy from the standpoint of engine wear when operated under the same service and maintenance schedules, as borne out by field experience. In an analysis of the fast-moving parts of four volume-produced engines from a material standpoint, it is brought out that there is quite a variation in material specifications, heat-treatment limits, and hardnesses. The discussion is confined to gasoline spark-ignition engines of the light-duty type.

To show the influence of manufacturing on engine wear the author states that there is as much difference in operating characteristics and wear rates between engines of the same manufacture as there is between engines of the different makes. To illustrate his point he cites the example of one manufacturer who obtains pistons and piston rings from several sources. However close the specification, he contends that these products will not all be uniform due to the irregularities and errors creeping into the production of each of these vendors and, the larger the number of sources, the greater the variation.

Lubrication, without question, is the most important single factor in connection with engine wear, he declared, taking up operating influence. He reports a great deal of confusion as to the type of oil to be used and the length of time between drains, and opines that the subject of oil draining and its effect on wear cannot be generalized. Under the heading of chemical influence, he discusses hot-spots, valve sticking, varnish, and fuels.

Bus Engine Wear – W. J. Cumming, Surface Transportation Corp.

WEAR found in the cylinder bore and piston rings of bus engines is the hardest to control, the author believes. Control of the "wear-in" period, he points out, has been made reasonably possible by well-developed and accurate cylinder-boring machines and tools, and piston rings that are surface-treated with iron oxides. From this point on, he shows that the problem becomes one of trying to reduce the "wearing-out" as much as possible over the entire life of the cylinder bore. Cylinder liners are cited as an aid to the reduction of wear. He stresses the importance of good lubrication in reducing wear and preventing ring-sticking and clogging. Modern engines of the high-compression type, he states, require not only the better grades of lubrication but the addition of inhibitors and the further periodic treatment of the piston crown with doses of the same additive. With this treatment, he reports, piston rings have been kept free and clean up to 50,000 miles of operation. Other items influencing engine wear discussed in this paper include: piston and piston-ring design, water temperature control, and crankcase ventilation.

Concluding with a discussion of the particular problems of reducing wear in diesel engines, he emphasizes that the most important single factor in the operation and maintenance of automotive diesel engines is the selection of proper fuels and lubricants. If the proper fuels and lubricants are selected, he asserts, diesel engines should give as satisfactory results from the wear angle as do gasoline engines.

Factors Affecting Engine Wear – G. W. Laurie, Atlantic Refining Co.

THIS paper deals with the experience of fleet operation on the subject of engine wear and its effect on mechanical maintenance schedule and operation. Data obtained from tests and operation history are utilized in setting up preventive maintenance schedules with the ultimate aim of reducing operating costs. They are subdivided into three general headings:

1. Engine valves
2. Cylinder wear
3. Bearing maintenance

Operation and test data with accompanying charts are included to show how these items were studied and how the results were incorporated in the maintenance program.

On Item 1 the importance of the valve spring on prolonging valve operating life is emphasized. Cylinder wear measurements and ring life are portrayed in the discussion of Item 2, while the necessity for close attention to bearing clearances in obtaining satisfactory bearing performance is stressed under Item 3.

Reference is made to improvements in design and materials on late-model vehicles with their resultant effect on method of maintenance and general overall operation.

In conclusion, the author states that the effective use of the data obtained from the operation of a variety and a large number of units permits him to exercise a preventive control based on actual facts, with the aim of eliminating as much as possible the use of guess-work in the maintenance schedule.

Regional Truck, Bus & Railcar Meeting
Chicago, Ill., Oct. 6, 1939

Modern Streamlined Railroading – Carl R. Gray, Jr., C. St. P. M. & O. Railway Co.

AS a background for his subject of modern streamlined railroading, the author sketches the historical development of the railroads in the last 112 years; presents data regarding the equipment; and shows the improvement in the equipment. Excerpts from historical records are used to illustrate and emphasize his points. In addition to the engines and cars the evolution of tracks, signaling systems, bridges, drainage, turntables, roundhouses, tunnels, and double tracking, is traced. Problems of shop maintenance and equipment are mentioned briefly, including those of cranes to handle the heavy locomotives, of fissures in the rail sections and how to detect them. Interesting facts are given of the background and mechanical specifications of the Union Pacific streamliner which was delivered on Feb. 12, 1934. The Burlington Zephyrs and other streamlined trains that followed are noted, up to the new Northwestern "400."

Railway Passenger Cars for High Speed Service – Peter Parke, Pullman-Standard Car & Mfg. Co.

THE essential features of modern railway passenger cars are described in this paper by first discussing car types and materials; then special passenger-car features, such as trucks and brakes; air-conditioning systems; and finally lighting and heating facilities.

Four general types of light-weight car structures being built today are compared:

1. The all-aluminum or riveted-girder type

side construction, lighter than any other type by several thousand pounds, but more costly.

2. The stainless-steel car of truss frame construction, with so-called "shot-welded" connections. Outside sheets are not strength members, being used as covers only.

3. High-tensile rust-resisting steel truss frame cars of all-welded construction with sides covered with light-gage corrugated stainless steel.

4. Welded girder car constructed throughout of high-tensile rust-resisting steel. Weighs slightly more than the truss-type car, but costs less.

It is brought out that the outstanding merit of streamlining cars for long high-speed trains is its great appeal to the esthetic sense of the public.

The importance of the high-speed braking problem is brought out by stating that the energy required to brake a train at 100 mph is nearly twice that required at 75 mph.

The Inside Story of a Weld – E. J. W. Ragsdale, E. G. Budd Mfg. Co.

HOW good a spotweld is will depend upon its size, its shape, and the quality of the metal in the fused region, as well as upon the quality of the non-fused metal surrounding it. This paper compares ordinary spotwelds with those made by the "Shotweld" system, especially when joining sheets of stainless steel. The Shotweld system is a trade name distinguishing ordinary spotwelding from a form which is so controlled as to prevent harmful disturbance of the properties of the metal in the weld or in the material surrounding it.

The importance of the shape of the weld is emphasized. The author claims that pure shear occurs only in textbooks – and that is why there are heads on rivets and why every failure of a structure shows popped rivets. He explains that an etched cross-section of a spotweld looks as if both sheets had been cut out to receive a separate slug of metal placed between them. When actual failure eventually occurs, the sheets are sheared from an apparent cylinder just as the head of a rivet is sheared from an apparent continuation of the rivet cylinder or shank.

An instrument used in the Shotweld system is described that records a line for every weld made, the length of which is proportional to the weld strength.

National Fuels & Lubricants Meeting Tulsa, Okla., Nov. 2-3, 1939

Vaporization Characteristics of Current Winter Motor Fuels – R. C. Alden, H. M. Trimble, and M. G. Blair, Phillips Petroleum Co.

BY applying mathematical relationships between ASTM distillation and equilibrium air distillation curves of winter motor fuels, the authors show:

1. That 1938 gasolines have pronounced lower vaporization temperatures than 1928 winter gasolines.

2. That there still prevails so great a range in vaporization characteristics of winter fuels that a fixed relationship between vaporization temperature and supplied air-fuel ratios can make fuel induction systems inoperable.

3. That ideal supplied air-fuel ratios for current motor fuels range from 1:1 to 6:1 at a vaporization temperature of 10 F, and through corresponding ranges at higher and lower levels for other vaporization temperatures.

4. That, in general, the vaporization characteristics of modern winter gasolines are such that, except at extremely low vaporization temperatures, only a very moderate choking is necessary to attain operable air-vapor mixtures.

Hypoid Lubricants – C. F. Prutton and A. O. Willey, The Lubri-Zol Corp.

THIS paper presents the chemical nature of modern hypoid lubricants with an explanation of their action and a general discussion of their stabilities and other vital characteristics, as indicated by laboratory and axle tests. The authors state that the primary requirement for the satisfactory lubrication of hypoid gears is the capacity for the prevention of scoring and excessive wear on the contacting gear tooth surfaces over a wide range of operating conditions. Their discussion is confined to types of hypoid lubricants for which General Motors specifications are issued. Although further improvements in hypoid gears may reduce the requirements for lubricant performance, the authors believe that this improvement will be counteracted by the tendency toward smaller gears with higher unit loads.

Three conclusions are given:

1. Present-day hypoid lubricants function by chemical reaction which produces a minute amount of solid lubricant at points of excessive pressure.

2. A careful balancing of the chemical activities of the reagents employed is necessary to obtain a lubricant composition which will be satisfactory over a wide range of operating conditions and long periods of service.

3. Modern hypoid lubricants of the "chemical" type are designed to meet the requirements as to film strength, stability, and wear demanded in field service.

Observations on Tractor Fuels – Characteristics and Requirements – E. L. Barger, Kansas State College.

IN this paper the author reports the results of performance tests on tractor fuels run at Kansas State College. They show that the relationship between brake horsepower at maximum safe sustained load (medium detonation) and octane rating of a distillate fuel is quite definite. He also brings out that higher octane number fuels show better thermal efficiency at maximum sustained safe loads while, at low loads, the lower quality fuels show to best advantage. He contends that high-load efficiency is most important for tractors which usually operate at heavy loads.

In concluding, Mr. Barger proposes a standard tractor fuel specification, the most important single factor of which, he believes, is a minimum octane number of 30. The specification calls for a minimum 5% point of 325 F; a maximum 10% point of 400 F; a maximum 25% point of 420 F; a minimum 95% point of 464 F; a maximum 95% point of 515 F; and an end point of 540 F. He explains that the minimum of not over 5% at 325 F is intended to eliminate doped, doctored, or spiked distillates, stating his objections to such additions. The 95% point of not less than 464 F, he continues, is essential so that the fuel will be excluded from the Federal gasoline specification.

Automotive Maintenance Cleaning Operations – H. Liggett Gray, Oakite Products, Inc.

THE development of technical cleaning methods has required practical consideration of, and experience with, one factor – "dirt" in widely varying types and conditions. Foreign matter is seldom one simple substance; it is generally very complex – that removed in different types of cleaning operations varying greatly.

The author points out that, by application of chemical, mechanical, and field observation and engineering, it is possible to give orderly classification to the different types of industrial cleaning and thus control them.

For automotive maintenance this paper classifies the various cleaning operations. Those dealing with mechanical cleanliness for proper operation of the units are outlined in detail. Interior and exterior cleaning of engines, freeing cooling systems of deposits, and cleaning of engine and chassis parts during overhaul are outlined as to method, type of cleaning material, and equipment.

Mechanical details of equipment used in several of these operations are given.

Too Old To Learn? – C. B. Veal, Society of Automotive Engineers, Inc.

ABOUT 27 million persons, or one-half of our total adult population, are enrolled in some form of adult education. Such education, continuing through years of maturity, engenders tolerance toward others and makes possible individual fulfillment. These are the only two forces that can successfully combat the spirit of hostility between countries, political, social or economic groups.

In engineering especially, the age limit in education has been raised. The Engineering Council for Professional Development, in its minimum definition of an engineer, specifies not less than four years after graduation from an approved engineering school as the minimum time in which a young engineer can be expected to reach full professional status. Along with the increased emphasis on the post college training of engineers has occurred a change in engineering colleges themselves. Engineering colleges are dropping specialized and purely informational courses in favor of fundamental and the development of the ability to observe, analyze, and reason.

Professional societies are performing the task of adult education in the field of engineering. The Society of Automotive Engineers may be cited as an example. The majority of its 6000 members are general or chief engineering executives, or production, design, or research engineers. They represent about 2000 companies in the aircraft, automotive, and automotive parts and material fields.

The SAE in 1938 held 12 National meetings which drew a total registered attendance of about 5000. Meetings of 22 sections during the year were attended by 25,000 members and guests. Specialized interests such as research and standardization are dealt with in committee meetings. Membership on SAE Research Committees totals 1050. Subjects dealt with include aircraft-engine lubricants, crankcase-oil oiliness, crankcase-oil stability, extreme-pressure lubricants, fuel, highways, ignition, and riding comfort.

The Present Trend in Design and Size of Military Aircraft – Barton K. Yount, U. S. Army Air Corps.

THERE is a definite trend to greater gross weight for each type of military airplane, due mainly to requirements for increased performance, which have called for larger and heavier powerplants. The overall size of our standard types remains about the

same, due to increasing compactness of design.

The trend to greater speeds continues, increases in speed being attained through aerodynamic refinement and increased power.

Present effort in aerodynamic refinement is to achieve very smooth surfaces and true contours, and to eliminate all gaps and air leakages.

Increased wing loadings and improved high-lift devices are inevitable. Assisted take-offs for certain types are a possibility.

There is promise of achieving laminar flow over a large portion of the wing, with consequent large reduction in wing drag. This line of development points to pusher-propeller installations.

Compressibility shock is becoming an imminent problem. Different wing sections and different fuselage shapes are being evolved to avoid compressibility effect. This effect indicates that maximum speed will be attained near sea level.

There will be increased use of stainless steel, magnesium, and plastic materials.

Superchargers are undergoing intensive development. Fuel in quantity of better than 100 octane rating can be expected soon. The trend to drive propellers through extension shafting has brought forth new powerplant problems.

The Multi-Fuel Engine, a New Internal Combustion Engine that Can Follow the Fuel Trends – P. C. Ritchie, Waukesha Motor Co.

THIS paper deals with the development of the Waukesha Multi-Fuel engine through the early adaptation of gas-burning equipment to the Hesselman oil engine and the later refinements which made possible an engine that could use the widest range of liquid and gaseous fuels, each one with good economy as measured by present-day standards and without any internal changes.

The commercial necessity for such an engine also is shown by a review of the progress made in the automotive vehicle field by the diesel engine itself. Special emphasis is placed upon the facility with which this engine may be serviced, the economy of its maintenance, and the flexibility of its performance. Figures are given to indicate the operating characteristics, power per cubic inch, weight per horsepower, and economy in pounds of fuel per horsepower hour for different fuels. Salient features of the engine are explained, bringing out the performance characteristics as obtained in the Waukesha Engine Laboratories.

Power Equipment for Earth Movement – J. M. Davies, Caterpillar Tractor Co.

COST records compiled by the Bureau of Public Roads on the cost of excavation on Federal aid projects from 1922 to date show a declining trend until the average unit price bid in 1938 was 45% of that bid in 1923, even though wages were 47% higher in 1938 than the average for the years 1919 to 1923. This lowered cost of moving dirt is a direct reflection of the improvement in power equipment for earth movement. This paper reports up-to-date methods for moving earth for road and other kinds of construction.

Modern power scrapers of the rotary type can move 15 cu yd of earth per hr over a 300-ft haul using a 30 to 35-hp tractor, and a 75-hp tractor can move 65 cu yd of dirt per hr on a 300-ft haul using a hydraulic-controlled bottomless scraper. One man can operate a tractor-powered 23-yd scraper over a 2500-ft haul and move 95 cu yd per hr, using a 95-hp tractor.

Two of the main problems in the design of these types of equipment discussed in this paper are the prevention of dirt entry into the working mechanisms and the design of suitable reduction gears to enable the tractor to exert a heavy pull at a fairly high engine speed. Sprockets, housed and sealed against entry of foreign matter, have solved the reduction-gear problem.

Metal Cutting Tests Using Butane, Propane and Acetylene – W. T. Tiffin and Ottie Eads, University of Oklahoma.

BUTANE and propane may be used as the pre-heating gases when cutting steel with the oxygen blast. However, the cutting cost per foot is higher than that obtained when using acetylene as the pre-heating gas, although the quality of the propane or butane cut is higher.

The higher cutting cost is due to the larger quantities of oxygen required when using butane or propane. Actual tests show the cost of butane or of propane when used for cutting to be almost negligible when compared with that of acetylene.

Research and redesign of the existing equipment available may improve and lower the cutting costs to that obtained by using acetylene. Further tests are contemplated.

In the exhaustive series of tests reported in this paper acetylene required 26.55 cu ft per hr to cut 1¼-in. mild steel at a rate of 69.2 ft per hr, at a gas cost of 3.23¢ per ft. Propane was consumed at the rate of 1.21 cu ft per hr and oxygen at the rate of 178 cu ft per hr to cut 64.3 ft per hr at a cost of 3.48¢ per ft. Butane used only 0.723 cu ft per hr, but oxygen consumption was 237.5 cu ft per hr to cut 54.5 ft per hr at a cost of 5.45¢ per ft.

Section Papers

Detroit – May 1, 1939

Rubber Suspension – *A. S. Krotz, B. F. Goodrich Co.* (Paper published, pages 471-477, Transactions Section, November, 1939, issue.)

Baltimore – May 11

Standardization and Simplification of U. S. Army Motor-Vehicle Equipment – *Major Walter C. Thee, Quartermaster Corps.*

AS a result of the purchasing system requiring competitive bidding and award of contract to the lowest bidder the Army now operates 28 different makes and models of passenger cars and 143 different makes and models of trucks, Major Thee points out. He believes that "this absurd situation" can be improved a great deal by vehicle manufacturers' standardizing unit assemblies up to the absolute maximum and unit manufacturers' keeping the types and models of units down to an absolute minimum.

He shows that interchangeability of parts simplifies inventories, warehousing, accounting, stock control, parts lists, procurement, requisitions, issues; reduces part or stock numbers and costs of parts and units.

The patriotic duty of the automotive industry, therefore, he contends, is to design and manufacture vehicles which will make possible the interchangeability of unit assemblies and parts – a duty not only to the Nation but also a service which it owes to the large fleet operators.

SAE Club of Colorado – May 23

M-G-H Performance Meter – *E. F. Harrison, Harrison Motors, Inc.*

THE use of the miles-per-gallon method for measuring the fuel economy of automobiles, regardless of the refinement obtained, is claimed to give only an average result over the distance. In this method the distance traveled by the car is determined, while a definite measured amount of fuel is being consumed. In some cases the distance traveled is measured by the use of a fifth wheel which has been calibrated carefully in order to eliminate any error resulting from variation in tire diameter. The reason only an average result can be obtained by this method, the author contends, is because of the lack of uniform performance caused by such variables as: temperature of the motor; condition of the road surface; road grade; velocity and direction of the wind; speed of travel; load carried by the car; adjustment of carburetor; timing of motor; gasoline used; tire inflation; and condition of spark plugs and pistons.

The instrument described in this paper indicates continuously on an electric meter the overall performance of a car in miles per gallon, just as the speedometer indicates continuously the speed of the car in miles per hour. Thus the effect of the previously mentioned variables can be observed at the time that they are influencing economy.

The major part of the paper describes an apparatus which produces a voltage which is a direct measurement of the speed in miles per hour and another piece of equipment which produces an electrical resistance which is a direct measurement of flow of gasoline to the engine in gallons per hour. These two electrical values are combined in such a way that the meter scale can be calibrated to give a direct reading in miles per gallon.

Northwest – Sept. 15

Industrial Cleaning Methods and Materials as Related to the Automotive Industry – *Valentine Gephart, Valentine Co.*

A LARGE number of emulsifiers and wetting agents are among the recent developments in the field of organic chemistry that directly affect the methods and materials used in metal cleaning in the automotive industry. These products may be defined as complex organic combinations for use as emulsifiers or surface-tension reducing agents. The development of these materials was made more for their application in the dye and fabric industry than for their use in metal cleaning.

The new developments in the category of synthetic soap substitutes, wetting, and emulsifying agents are now available in many finished products of reliable manufacturers. These products contain one or more of the many new solvents produced by introducing hydroxyl and similar radicals into olefinic hydrocarbons and combining, condensing, or polymerizing these into a very wide variety of new solvents, such as ethers, esters, and cyclo compounds. Such compounds have very unusual and remarkable solvent qualities and, in many cases, have the property of being both oil and water miscible.

This paper describes in turn each type of development in the chemical field of industrial cleaning, and shows just what changes and benefits modern research has given the automotive engineer in furnishing correct chemicals for every job. Considerable space is given to alkalies and soaps.

Tulsa Group – Sept. 29

Maintenance and Utilization of a Public Utility Fleet – *H. R. Grigsby, Oklahoma Gas & Electric Co.*

THE average mileage for the year 1938 per passenger car and per pickup in the public utility fleet discussed in this paper is 1143; while the average mileage for trucks of 1½-ton size and larger was only 664 per month. The 30 to 50 calls per day "stop-and-go" operation imposed on the vehicles by the service men causes the vehicles to work under very unfavorable conditions. Trucks are equipped with winches, pole derricks, and hole diggers; all line trucks are equipped with special bodies with compartments for materials, tools, and special equipment. The fleet comprises 134 passenger cars; 196 commercial vehicles, mostly ½ and ¾-ton trucks with pickup bodies; 69 trucks 1½-ton and up; and 48 pieces of miscellaneous equipment.

Light company service garages and two storage garages are operated to maintain this equipment. Employee-owned vehicles also are operated on a mileage basis paid on a sliding scale.

The maintenance and repair schedule includes a short inspection every 2500 miles and a complete inspection every 5000 miles. The paper also discusses maintenance of vehicles in isolated points, motor oil, gasoline, drivers' effect on operating costs, pooling of passenger cars, cost accounting, purchase of vehicles, new vehicles – equipment, bodies, special equipment, utility of light trucks.

Detroit – Oct. 2

The Dynamic Fatigue Life of Rubber – *S. M. Cadwell, R. A. Merrill, C. M. Sloman and F. L. Yost, U. S. Rubber Co.*

THIS paper reviews the results obtained in studies on the dynamic fatigue life of rubber. These results show the critical dependence of the fatigue life on the imposed oscillation conditions.

The dynamic fatigue life of rubber which is being vibrated linearly is discussed first, with a description of the apparatus and explanation of test methods. A dynamic fatigue life curve shows that the rubber under linear vibrations exhibits a minimum dynamic fatigue life when the minimum length of the vibrating member is equal to its free unstrained length.

Fatigue life curves obtained under constant-load conditions show a similarity to the fatigue life curves for constant-strain oscillation. Similarly, test data on the dynamic fatigue life of rubber vibrated in shear are entirely in accord with what would have been predicted from the linear fatigue data.

Pittsburgh – Oct. 17

New Engine Developments – *Max M. Roensch, Chrysler Corp.*

OF the two major problems in engine development – to increase engine output and to keep the engine together in spite of additional power – this paper deals with the second problem.

The most critical time in the life of an engine is during the break-in period as, regardless of the accuracy and finish of the cylinder bore and the fit of the piston rings in the bore, these parts must be run in to produce a satisfactory surface that will carry the loads of high-speed operation without failure. When, as often occurs, engines are not run in carefully, scuffing occurs. This scuffing may heal up with further running but, in severe cases, the rings may have to be replaced to restore control.

This scuffing may be eliminated or alleviated by the use of piston-ring coatings. The major part of this paper is comprised of a discussion of different coatings used on the piston rings of three manufacturers, each of which has a different idea of a proper coating. These coatings – tin coating, iron-manganese-phosphate coating, and iron-oxide coating – are applied by different methods, and both the method and chemical composition of each coating are explained.

Tin coating consists of an electrolytic deposition of tin on the surface of the piston ring. Iron-manganese-phosphate coating consists of an iron phosphate with a high percentage of manganese phosphate. This coating is softer than gray cast iron and sufficiently porous to adsorb an appreciable amount of oil. The treatment necessary to supply iron-oxide coating consists of oxidizing the machined surfaces of the iron to a predetermined depth in an enclosed chamber heated to a temperature of approximately 1000 F in the presence of a suitable gaseous oxidizing agent.

Test results are reported showing that treated piston rings were only half as much as untreated rings, and the difficulty of comparing results from one engine to another.

Detroit – Oct. 23

A Critical Study of Brake Lining Testing Methods – *T. R. Stenberg, Marshall-Eclipse, Division of Bendix Aviation Corp., and C. N. Menz, Rensselaer Polytechnic Institute.*

THIS paper provides a common ground for discussion of the laboratory and test-car schools of thought on brake-lining testing. An attempt is made to provide three common indicators and, with these indicators as a basis for comparison, to show that there is a reasonable possibility of getting certain laboratory results to agree with road-test results within a very small percentage of error. The three common bonds are torque curves, deceleration curves, and a value for the coefficient of friction. Methods and apparatus compared in the first section of this paper are the prony brake dynamometer, General Motors-Chase machine, Bendix-Cowdrey machine, inertia dynamometer, and road tests. It is shown that, using the torque-curve method of test on the inertia dynamometer has the foregoing three common bonds of direct comparison with road tests, and that erraticity is perhaps the one characteristic of a brake lining which this test cannot demonstrate.

The final section of the paper is devoted to road-testing methods; it shows how torque curves, deceleration curves, and a definite value for the coefficient of friction can be obtained from the road-test results.

Richmond – Oct. 27

How Motor Trucks May Develop – *M. C. Horine and D. C. Fenner, Mack-International Motor Truck Corp.*

THIS paper is a stenographic record of an informal discussion by Mr. Fenner and Mr. Horine. They emphasize that motor-truck engineering at present is limited by three main influences entirely outside the field of engineering – legislation, economics, and world politics, and that these three influences may affect development in the next ten years profoundly. Legislative influences, they believe, loom as a constant threat to orderly development; for example, the present agitation for legal standards of performance, if carried to extremes, might well overturn the entire structure of the industry and radically alter its relationship to other forms of transportation.

Tractor semi-trailers, they contend, have been overemphasized as a result of regulations which have discriminated in their favor. Without such regulations and taxations they believe that trucks would be larger; that there would not be so many tractor semi-trailers; that sleeper cabs would be more popular; and that excessive speeds would be reduced. "Unwise legislation and uninspired administration of this legislation" is charged with the greater part of the responsibility for overloading. They contend that, if the money levied from motor-vehicle users were honestly and intelligently spent on roads and bridges instead of being diverted to other uses, there would be no need for uneconomic restrictions on gross weights.

If the industry is able to develop unhampered, they predict that motor trucks within the next ten years will become more economical, more reliable, safer, better in performance, easier to operate and maintain.

Detroit – Nov. 6

What Is It All About? – *C. B. Parsons, Parsons Co.*

THE title: "What Is It All About?" is explained as being what the carriage builders asked when the automobile made its appearance at the turn of the century. This paper turns back to the early days of the automobile industry, unfolding its forty-year development in terms of statistics and personal anecdotes of its pioneers. Mr. Parsons describes early automobile races. He points out that he has counted over 100 different makes of automobiles made in the early days that are now out of business. He brings out that, at one time, 27 coats of paint were used on automobile bodies.

In his conclusion he reviews present developments and speculates on the future, covering finish, safety glass, cushion rubber, heating and air conditioning, and plastics.

Chicago – Nov. 8

Trends in Automotive Design – *J. Edward Schipper, Schipper Associates.*

MR. SCHIPPER contends that since 1930 economics has played an even stronger part in determining automobile design than has engineering. He believes that it is economics in the form of the "coldly critical eye of the management" that has brought many of the healthiest engineering trends to "an early and untimely demise." As an example he points to the rear-engine car. He adds that, in the motor-vehicle field where vehicles are purchased by experts "who think more of returns on their investments than of the sheet-metal exterior," engineering progress has been far more rapid during the past few years than that in the passenger-car field.

The author states that 1940 marks a milestone in automobile design between periods of development. In the years up to 1930 was a period of rapid development of basic principles; from 1930 to 1940 has been a period of style changes and mechanical refinement; and the period ahead will represent another great forward stride in fundamental development. Basic changes in fuels, materials, and design, the last due to unification of body and chassis, will occur, he predicts.

1940 design trends are reviewed in the major part of this paper. The Oldsmobile Hydra-Matic transmission, sealed-beam headlamps, body designs, and engine developments are featured. A brief review of commercial-vehicle developments concludes the paper.

Southern California – Nov. 10

The Paxton Motograph Principle of Operation – *V. K. Morgan, Cedar Rapids Engineering Co.*

THIS paper contends that more than 85% of all engine trouble is caused by leaky valves. Tests are reported that showed that the longest any valve would function before a leak occurs is 280 hr. Translated into common usage this period is equivalent to 4000 miles at 20 mph. It is explained that the engine tested was the best available, and the valve seats were aligned concentric with the valve-stem guides by means of a microscopically tapered arbor.

Examples are given of increasing the miles per gallon of buses and passenger cars by using a tapered arbor to realign the valve seat with the centerline of the valve stem. The author emphasizes that the most important measurement in an engine is the misalignment of 0.001 in. from being concentric with the centerline of the valve-stem guide. He also contends that as much as 40% of the efficiency of the valve is lost because of a weak spring.

The remainder of Mr. Morgan's paper is devoted to a description of the "Paxton Motograph," a device claimed to detect leaky valves, weak springs, faulty spark plugs, defective coils, or broken condensers, and to furnish a record thereof.

Metropolitan – Nov. 14

Hypoid Gears in Passenger Cars and Trucks – *W. A. Witham, Gleason Works.*

THIS paper explains the fundamental difference between hypoid and spiral-bevel gears. It is pointed out that the tooth action of hypoids combines the smooth rolling action of spiral-bevel gears with a low percentage of endwise sliding action introduced by offsetting the pinion. Advantages of hypoid gears are reviewed, bringing out that of lowering the entire car by the full amount of the offset without loss of headroom and the fact that the average automotive hypoid pinion is 25% larger in diameter than a comparable spiral-bevel pinion.

In a discussion of production methods of hypoid gears the author states that the introduction of the single-cycle method of cutting Formate or non-generated ring gears has been the most noteworthy advance. This and other production methods are described.

Test data are given to show the action of hypoid gears under load, which bring out the effect of deflection of the axle under load and flexibility of the housing. The author contends that hypoid gears will show at least ten times the fatigue life of spiral-bevel gears, and that service records have shown that they give ten times the mileage without tooth breakage.

In a concluding discussion of lubrication the author points out that, with the constant improvement of surface finish and accuracy of the hypoid gears themselves, and with the general increase in the rigidity of axles, allowing a greater part of the potential, load-carrying capacity of the gears to be utilized, the need for powerful EP lubricants is lessened materially with many manufacturers of hypoid axles recommending the mild type of EP lubricants.

Milwaukee – Nov. 16

Hydraulic Drives in Industrial Service – *R. M. Schaefer, Twin Disc Clutch Co.*

SMOOTH starting, absorption of shock loads, absorption of engine torsional vibration, limiting torque capacity, and high torque capacity at low rpm are advantages to be obtained with a hydraulic drive listed in this paper.

Hydraulic drives are classified into two basic types:

1. The positive-displacement type, which consists generally of a positive or variable-displacement pump and a constant-displacement hydraulic motor, either to the piston or of the eccentric type.

2. The turbo type, which depends upon the kinetic energy of the fluid discharged by an impeller or pump on the input side against the vanes of the turbine or runner.

It is explained that the turbo type depends upon the change of the kinetic energy of the fluid during its circulation, whereas the positive-displacement type depends upon the transfer of liquid under pressure at low velocity. For this reason the positive-displacement type does not have the shock-absorbing qualities that can be obtained with the turbo type. It is pointed out that all of the hydraulic drives which have been developed and applied recently in connection with internal-combustion engines are of the turbo type.

This paper demonstrates clearly the different performance characteristics that can be obtained with each of the two basic types of turbo hydraulic drive – the hydraulic coupling and the torque converter – when used in connection with internal-combustion engines.

Southern California – Nov. 17

Streamlined Engine Maintenance – *R. L. Faber, Wilbur G. Perriguey, and Clifford R. Stewart, Fabor Laboratories, Inc.*

IN order to present data covering the entire United States, three authors collaborated in the preparation of this paper. These data have been gathered from the operation of approximately 20,000 engines. The authors explain that the yardsticks and processes used in developing the statistics presented are the evolution of a system that has experienced one-half million used-oil analyses during the past twelve years.

The title "Streamlined Engine Maintenance" is defined as "a maintenance plan which by design figuratively eliminates sharp angles and permits the more direct course to a given point with the least resistance."

Five cases of thickened viscosity of crankcase oil which resulted from entirely different causes are compared and discussed. By means of service records and specific examples the authors take up average fuel dilution, average solids, water and sand in crankcase lubricants. Clogging oil rings, gummed pistons and rings, and varnishes and shellacs also are subjected to analysis.

Detroit – Dec. 4

Engine Wear – Its Relation to Microstructure and Hardness – *Paul Lane. Koppers Co., American Hammered Piston Ring Division.*

THIS paper reviews the nature of cast iron and comments on the effects of structure, hardness, alloy content, and so on. The author explains that, since engine wear which occurs in service is influenced by many things other than the metal structure and hardness, it is necessary to picture an imaginary engine in which only the metal itself determines its wear.

In a discussion of the reasons why gray cast iron is a better bearing material than steel, it is brought out that this is due to presence of graphite and to its heterogeneous structure. Since steel is harder, stronger, and purer than cast iron, the author reasons that these qualities are not necessarily functions of the best wearing qualities.

Laboratory testing for metallic wear, automotive engine wear, hardness of rings and cylinders, surface action versus weight loss, influence of section and composition, influence of alloys, and influence of heat-treatment are the subjects discussed in the remainder of the paper.

Cast Iron Cylinder Bores: Observations on Microstructure, Composition, Hardness and Wear – *E. K. Smith, Electro Metallurgical Co.*

POINTING out that service tests are accurate but long drawn out and that laboratory tests are expensive, the author contends that the microscopic examination of cast iron is both rapid and inexpensive and offers the foundry laboratory a valuable means of controlling this structure. He explains that this examination supplements and confirms the present chill tests, Brinell hardness number, and analyses.

Microstructures discussed in this paper include those of sections from a number of new motor blocks and from a number which had definite mileage and measured wear. Answers to the following questions were sought: What is the actual structure at the point of maximum wear? How does variation in structure affect wear? What is the most desirable structure for cylinder bores, considering machinability and cost as well as wear?

In a summary of the effect of the various elements of cast iron on its microstructure when other variables are considered constant, it is brought out that silicon and carbon soften the iron; that manganese aids in controlling the effect of sulphur; that high phosphorus content tends to make the iron brittle, but hard phosphide inclusions retard wear; that nickel acts as a graphitizer, promoting machinability; that chromium forms stable carbons; and that molybdenum promotes strength.

It is concluded that cast irons with normal flake graphite give the best wear; those with large amounts of ferrite give poor wear; irons with ferrite-fine graphite structure give the worst wear; and irons with excessively coarse graphite give porous bores.

The paper is concluded with a brief digest of current ideas on the causes and prevention of cylinder wear, including abrasion, corrosion, and structure.

Chicago – Dec. 5

Operation and Maintenance Applied to Newspaper Service – *Paul Harvey, Garage Service Corp.*

THIS paper outlines the operation and maintenance system of the Garage Service Corp., a subsidiary company of the Chicago Herald-American, devoted exclusively to the delivery of newspapers in the greater Chicago area. 250 trucks are used with a combined total mileage of approximately 5,000,000 per year. All of the trucks are serviced at a central garage. As a strict time schedule must be maintained at all costs, which increases the probability of damage due to accidents, this service is considered a very severe type. The goal of the system is stated as to operate the vehicles for a period of 100,000 miles without maior repairs or replacements. After this period of operation the vehicles are replaced with new equipment. Service and accounting are on a cost-per-mile basis.

Each vehicle is taken out of operation for an 8-hr period once in every 2000 miles for general servicing. At 1000-mile intervals the

trucks are greased completely and the battery water checked.

The results of considerable experimenting with ways and means to prevent the loss of anti-freeze solutions are presented.

The author believes that the same power performance and gasoline economy can be had from the slower larger engines as are obtained in the smaller higher speed engines.

Southern California – Dec. 8

Accurate Comparative Road Testing of Fuels – *L. J. Grunder, Richfield Oil Corp.*

ROAD testing of gasoline in all types of equipment under all kinds of topographical and weather conditions is "the most informative and fascinating phase of fuel development," Mr. Grunder believes. Handling all makes of passenger cars, trucks and buses, he adds, gives a familiarity with fuels that can be obtained in no other way.

His paper recounts the development of road testing of fuels and reveals improved methods for accurate road testing. Differentiating between the Research, Motor, and L-3 methods of rating fuels, he points out that West Coast refiners all report the Motor Method, whereas laboratories east of the rockies all report L-3 ratings. He claims that this condition accounts for the so-called higher octane ratings given to many Eastern fuels which actually are inferior in anti-knock value to the Western fuels when used in cars and trucks.

Mr. Grunder explains that the steady increase in the use of "cracked" fuels had complicated the problem, as the road performance of highly cracked fuels differs from that of straight-run fuels of the same laboratory octane number.

Although the most severe engine knock is attributed to full-throttle operation, he brings out that more and more attention is being given to part-throttle knock.

Hypoid Gear Lubrication – *A. O. Willey, Case School of Applied Science.*

IN his introduction to this paper Prof. Willey asks how many individual types of gear lubricant must be supplied to meet the service demands of present-day automotive equipment. For example, whether it is necessary to provide:

1. A straight mineral oil for transmissions and overdrive units.
2. A mild extreme-pressure lubricant for highly loaded spiral-bevel gears.
3. An extremely active material for passenger-car hypoids.
4. A still different type of high-load capacity lubricant for commercial vehicles equipped with hypoid axles.

When one considers that the basic requirement for a lubricant is simply that it perform satisfactorily in service, it hardly seems necessary that four or more different materials should be required, or that such products must pass more than 30 tests, involving both physical and chemical studies of the most varied types. However, if the above simple requisite is changed to its more accurate form by adding that the lubricant must perform satisfactorily *under all conditions met with in service*, the soundness of a diversified and elaborate test program is not so questionable.

In an effort to summarize the gear lubricant situation, this paper was developed with the following distinct purposes in view:

1. To discuss the generally accepted theories of extreme-pressure lubrication.
2. To summarize the types of materials which have been employed to impart extreme-pressure characteristics to lubricants.
3. To enumerate the many tests that have been used to evaluate the ability of a lubricant to give satisfactory performance under all types of operating conditions.
4. To point out the lack of correlation of many of these tests with service results.
5. To offer some suggestions as to possible means of overcoming the complicated and uneconomic situation now facing the marketer of hypoid lubricants.

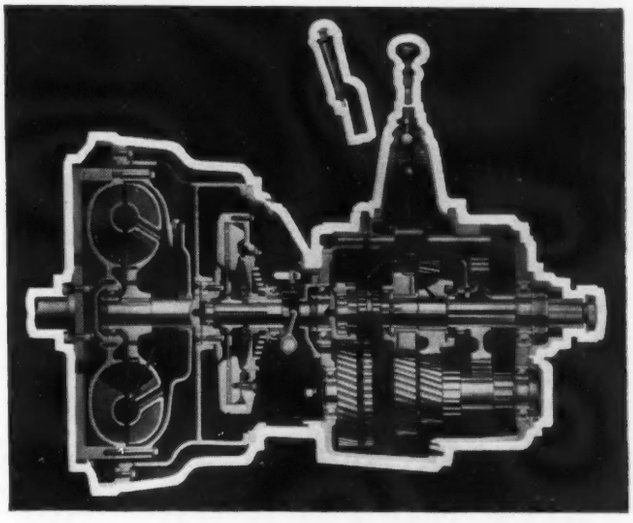
Northern California – Dec. 12

Present Day Truck Diesel Engine Practice and Problems – *R. P. Meehan, Cummins Diesel Sales Corp.*

EXPLAINING that diesel engines first made their appearance in trucks approximately seven years ago, Mr. Meehan points out that experience on this subject is limited for this reason. He divides the subject of modern truck diesel-engine practice into three parts:

1. The mechanics of the modern truck diesel engine.
2. The personnel problem of the modern truck diesel engine, that is, the question of whether it takes specially trained mechanics and drivers.
3. The economics of the truck diesel en-

The HYDRAULIC COUPLING *and* Standard FULLER Transmission *in* Heavy Duty Truck Service



Fuller

The hydraulic coupling as developed by The American Blower Corporation and the standard Fuller transmission in heavy-duty truck service has been tested and proved by actual operation in hauling heavy loads of iron ore out of open pit mines on the Minnesota iron ranges.

Fuller has simplified installation by providing an adaptor between the engine and the standard Fuller transmission to house the hydraulic coupling. Check these installation features:

1. **Standard engine flywheel housing.**
2. **Standard friction clutch.**
3. **Standard transmission and clutch housing.**

The use of the hydraulic coupling provides entirely new heavy-duty truck operating characteristics. Check these features:

1. **Dampens out engine periodic vibrations at all engine speeds and cushions shock loading in the drive line.**
2. **Engine cannot be stalled by wheel resistance.**
3. ***Makes possible the starting of a load on an upgrade in the highest transmission ratio that could ordinarily be used without a loss of truck speed to negotiate the same grade.**
4. **The friction clutch can be fully engaged at any and all engine speeds before accelerating the engine which will increase indefinitely the life of clutch facings.**
5. **Less gear shifting required by operator which reduces driver fatigue.**

NOTE: (Explanation of item 3). If sufficient resistance is applied to the coupling output shaft to bring the R.P.M. of this output shaft down to or below the engine maximum torque R.P.M., the engine (under full throttle) will continue to operate at the max. torque R.P.M. Since the coupling output torque is always equal to the input torque, the maximum torque which can be developed by the engine will be delivered to the output shaft. Consequently any transmission ratio which provides sufficient reduction to negotiate a grade without loss of road speed can be used in conjunction with the coupling to start and negotiate the same grade.

Write **for illustrated pamphlet which describes the combinations of Fuller Transmissions and Hydraulic Couplings.**

FULLER MFG. CO., Kalamazoo, Mich.

gine, that is, in what usage and under what conditions are their purchase and use justified?

During the first few years of diesel truck usage, he recalls that it was not uncommon to have the maintenance and repair of the accessories *exceed* the cost of maintaining the engine itself. Today, he believes, these accessories are much improved.

He contends that cylinder-wall wear in truck engines is materially less than cylinder-wall wear in gasoline engines. Calling the opinion that a diesel engine is all right in long-haul work but not in short-haul service, an "idle statement made by a lot of anti-diesel engine men," he averred that, from a performance and mechanical standpoint, the diesel engine in a truck is far better adapted to short-haul heavy work than the gasoline engine ever was.

Philadelphia – Dec. 13

Unconventional Transmissions – ***Howard A. Flogaus, J. G. Brill Co.***

NEW and conventional transmissions known to the trade are divided into the following classes: electrical; hydraulic; friction; mechanical inertia; and mechanically geared transmissions.

In view of the new unconventional transmission principles for vehicle propulsion, the author suggests that the passenger car and commercial vehicle may part ways, as it is likely that the range of torque conversion satisfactory for passenger cars will lead into design principles that are unsatisfactory for buses and trucks.

Mr. Flogaus doubts whether electrical transmissions ever will be adapted to passenger-car use because of their high cost and weight. He adds, however, that electrical transmission systems provide a truly infinitely variable transmission with the desired smooth start and ease of control. The operating principles of the two classes of hydraulic drive systems – fluid clutches and hydraulic converters – are explained. Advantages, disadvantages, and commercial limitations of friction and mechanical inertia systems are set forth.

Mechanically geared systems are classified as:

1. The conventional arrangement of two parallel shafts with the required number gears for the speeds desired.
2. The planetary cluster type through which any desired number of speeds can be secured by using the planet clusters in series.

Specific commercial designs are employed to illustrate the various classifications of transmissions.

Southern California – Dec. 15

Small High Speed Single Sleeve Valve Engine – ***Ashley C. Hewitt.***

THIS paper presents the development, construction, and performance data of a small high-speed outboard motor equipped with a single sleeve valve. The engine specifications are: 1-cyl; four-cycle; air-cooled; 1¾x1¾ in. bore and stroke; 4.21 cu in. displacement; 7:1 compression ratio; gear reduction, 7:1; fuel, Ethyl gasoline; and oil, SAE 50.

Mr. Hewitt explains how easily the principal parts can be die cast, as all the cores are straight pulls, with the cylinder (no liner), cylinder head, piston, connecting rod, and crankcase of aluminum, each of an appropriate alloy for its function.

A power curve is included which shows a maximum power of 2.89 bhp at 6100 rpm., giving a specific output of 0.686 bhp per cu in. The author points out that this specific output of this small unsupercharged 1-cyl single-sleeve-valve outboard motor compares favorably with specific outputs of large supercharged aircraft engines.

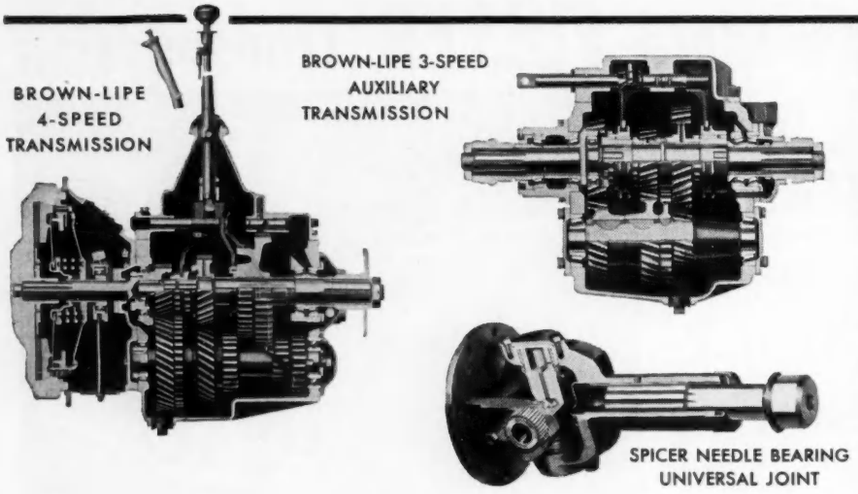
Dynafocal Suspension for Radial Aircraft Engines – ***T. L. Yates, Lord Mfg. Co.***

DYNAFOCAL suspension is described as a directional spring mounting system which accomplishes a true center-of-gravity support for an overhung mass, and provides sufficient flexibility for the absorption of both angular and translational vibratory disturbing forces, without undue loss of stability for the supported assembly.

The name "Dynafocal" represents the term under which this system of engine mounting is being marketed. It is a combination of the original name, "Dynamic Suspension," and perhaps a more descriptive term, "Focalized Support." Credit for the conception of the focalized suspension should be given to E. S. Taylor of the Massachusetts Institute of Technology, and practical development of the link method of application is credited to K. A. Browne of Wright Aeronautical Corp.

This paper reviews the principles underlying the design and describes the Dynafocal suspensions now in use with the idea of showing the practical benefits which can be provided through the application of these principles.

WORTH TALKING ABOUT!



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